General Index

—TO—

Sidereal Messenger, Vol. 1-10

MARCH, 1882—DECEMBER, 1891

Astronomy and Astro-Physics, Vol. 1-3

JANUARY, 1892—DECEMBER, 1894

Popular Astronomy, Vol. 1-16

BEGUN, SEPTEMBER, 1893

By Authors and By Subjects

Compiled under the Supervision of
THE EDITOR

NORTHFIELD, MINNESOTA, U. S. A.
1909

XUM

UNIVERSITY OF
MINNESOTA
LIBRARY

COMPOSED AND PRINTED BY
NORTHFIELD NEWS
NORTHFIELD, MINNESOTA

XUM

The Editor gratefully acknowledges a grant of One Hundred Dollars by Professor E. C. Pickering from the International Science Fund of Harvard College Observatory, and a gift of Two Hundred Dollars from G. R. Agassiz, of Boston, to assist in the publication of this General Index.

—William W. Payne.

D. 4/09 Pickering Fd Library. 262

77072

XUM

KEY TO ABBREVIATIONS USED

S—Sidereal Messenger.
A—Astronomy and Astro-Physics.
P—Popular Astronomy.
Cor.—Correction.

UNIVERSITY OF
MINNESOTA
LIBRARY

Index of Authors

XUM

INDEX OF AUTHORS

Volume and Page

ABBOTT, C. G., Probable nature of the corona P16: 519
ABNEY, W. de W., Limit of visibility of spectrum rays A1: 296
Medal-awarding address A3: 283
ADCOCK, R. J., Equations for an ellipse drawn through 5 points S9: 222
AITKEN, R. G., Companion to β *Orionis* (= β 555) P6: 585
On double stars P13: 65
Orbit of β *Delphini* P10: 486, 11: 28
β 395 = *Ceti* 82 ..... P13: 190
ζ *Sagittarii* P9: 57
Review: *Double Star Catalogue* by S. W. Burnham P8: 228, P15: 404
Sources of Standard Time in the U.S. P10: 12
ALBRECHT, S., Distortions of photographic films on glass P15: 463
AMES, J. S., Line spectrum of oxygen A3: 505
Modern spectroscope A1: 28
Probable spectrum of sulphur A2: 50
Work of Kayser and Runge on spectra of elements A2: 226
ANDERSON, T. D., Searching for new stars P10: 246
APPEL, D., Free escapement with independent balance A1: 872
ARCTOWSKI, H., Northern and southern lights at the same time P9: 207
AUHAGEN, W., A Demonstration P15: 445
AYER, J. E., Gravitation P13: 170
BACKHOUSE, T. W., Maps for tracing meteor paths S5: 114
Structure of the sidereal universe S9: 337
BACON, C. A., Sun-spot observations at Smith observatory .....
..... S9: 137, 230, 278, 375, 417, 467; S10: 36, 103
BAILEY, S. I., ω Centauri A2: 689
BAKER, R. H., and D. TODD, Predictions of eclipse, Aug. 30, 1905 .... P13: 240
BARNARD, E. E., Astronomical photography with a portrait lens P16: 286
Aurigae, Nova P2: 307
Comet II 1882 (*b* 1882) S1: 221, 255
V 1889 (*d* 1889) S8: 360
V 1892, (*e* 1892) Photographic discovery of P3: 13
c 1893 Brooks (Oct. 17, 1893) A3: 789; P1: 145
d 1907 (Daniel) P16: 591
Gale, Photographs of A3: 421, 706
Swift observed and photographed A1: 386
Comets' tails and their probable explanation P12: 1
Determination of ball and ring system P2: 295
Development of photography in astronomy P6: 425
Diameter of Ceres, Pallas and Vesta A3: 341
Diameters of south polar caps of Mars, 1892 and 1894 ..... P2: 433
Eclipse of moon, 1889 ..... S8: 137
in Sumatra P9: 527

XUM

Volume and Page

BARNARD, E. E., *(Continued)*
Eros observed at Yerkes observatory....P8:519
Four little sky travellers....P3:143
Gegenschein or zodiacal counterglow....P1:337; P7:169
Jupiter's spots and markings, Motions of....S10:413
red spot....A1:93, 686; A3:736; P2:129
satellite III....A3:821
V....A3:556; P1: 76
satellites....A3:272, 438
Mars observations at Lick observatory....A1:680
Mercury, 1894, Transit of....P2:168
Merope nebula, Drawings of....S1: 24
Meteor trains drifting....S1:174; S10:426
Meteors, Biela....S5: 74
Photography of....P5:281
Micrometrical determination of dimensions of planets and satellites..P5:285
Nearer to the stars....P2:245
Nebulosities and clusters in the Milky Way, Photographic....A3:177
ρ *Ophiuchi* nebula and smallness of ground-work stars....P5:227
Orion nebula, Great photographic....A3:811; P2:151
Pleiades, Exterior nebulosities of the....A3:768
Swift's nebula in *Minoceros*....A3:642
Trifid nebula, Photographs of M8 and....A3:791
Photographing with a non-photographic telescope....S10:331
Proper motion of stars in the Dumb-Bell nebula....A3:445
Saturn, Transparency of Crape ring....A1:119
Stellar photography....S6: 58
Strange astronomical coincidences....S10: 18
Vacant regions of the sky....P14:579
Variable in M13 *Herculis*....P8:486
Venus' transit....S1:290
BARNUM, C. C., Sophie Kowalevski....A1:281
BARR, J. M., Orbits and velocity curves of spectroscopic binaries....P16:259
Study of variable stars....P15:217
BARTLETT, A. K., Curious optical illusions....P12:123
Heavens in winter....P13: 30
Moon and the weather....P10:368
Origin of the tides....P11:404
Solar and sidereal time....P12:649
Wet and dry moon....P9:442
Zodiacal light....P10:179
BECKER, L., Spectroscope of the Royal observatory, Edinburgh....A2:542
Spectrum of Nova *Persei*....P12:603
BELOPOLSKY, A., Motion of ζ Herculis in line of sight....A3:130
Spectrum of β *Lyrae*....A2:258
Sun's rotation determined by faculæ....A2:632, 637

XUM

Volume and Page

BICKERTON, A. W., Explosion of stars P12:666
BIGELOW, F. H., Aurora-inclinometer, A new S10:496
Automatic transit instrument S7:205
Computations of clock corrections S7: 97
Cooling envelopes S6:170
Eclipse expedition to West Africa S9:145
Function of criticism in the advancement of science P7:252, 292
Harkness, William P11:281
Heliographic longitudes A2:821
Magnetic fields surrounding the sun ..... A2:706, Cor. A2:848
Mounting telescopes for eclipse observations A1:257
Photographic method of determining stellar places A1: 42
Polar radiation of the sun A3: 25
Solar corona of total eclipse, 1893 ..... A2: 97
Standardizing photographic films without a standard light S10:385
Sun as a magnetized sphere P14:37, 463
Sun-spots as vortex rings S6:139
Weather indications along the eclipse path, May 28, 1900 ..... P7:451
West Indian hurricanes and solar magnetic influence A3:441
BIGOURDAN, Eclipse of Aug. 30, 1905, at Sfax, Tunis P14: 28
BISHOP, S., Origin of the red glows S5:128
BLAKSLEE, T. M., The law of the lanes P13:111
BLINN, F. G., A non-interfering break-circuit for clocks S10:475
BLISS, G. A., Motion of a heavenly body in a resisting medium P6: 20
BOCCARDI, G., Photography of the heavens P12:521
BORASTON, J. M., Andromedes A2: 3
Distribution of stellar types A2: 57
BOSS, L., Comets; their composition, purpose, and effect upon the earth S1: 1
Convergent of a moving cluster in *Taurus* P16:566
"National" vs. "Naval" observatory S10:161
BOWEN, E. A., Jupiter at opposition P1:133
Lesson on harvest moon P1: 32
Visualizing the earth's annual motion P1:178
BOYD, J. H., Position of orbit of companion of a binary star P3: 19
BOYS, C. V., Newtonian constant of gravitation P3:128, 167; P4:77, 120
BRACKETT, F. P., Leonids observed at Park college P8:163
Pomona college P7: 30
BRACKETT, S. H., Improvised chronograph A1:252
BRASHEAR, J. A., Allegheny observatory P8:541
Care of, and cleaning of, object-glasses P2: 9
Clark, G. B. A1:367
European trip S7:391; S8: 7
Keeler, James E P8:476
Langley, Samuel P P14:257
Manufacture of glass for optical uses P6:104
telescope objectives P1:221, 241, 447; P2: 57

XUM

Volume and Page

BRASHEAR, J. A., *(Continued)*
Refinement of modern measurements S9:204
Ring of light around Venus S1:263
Rock salt for optical purposes S5:149
Solar eclipse of 1888 report S8:120
Standard dimensions in astronomical instruments S7: 77
Swasey, Ambrose P7:345
BRENKE, W. C., Apparent figure of the sky P9:351
Leonids in 1901 ..... P10:105
BRESTER, A., Jr., Theory of the sun A2:914; A3:218
Views on tranquility of the solar atmosphere A3:849
BRIDGES, R., The Astronomer (C. A. Young) P13:172
BRONTE, P., Halley's Comet in 1835 ..... P12:571
BROOKINGS, E. J., The red light S9:149
Waters upon the earth S8:301
BROOKS, W. R., Comet seeking P7:157
BROWN, E., Unusual sun-spot A2: 74
BROWN, S. J., Astrophotographic conference, July, 1900 ..... P8:355
Solar parallax from observations of *Eros* P8:353
BROWN, W. V., McKim observatory equipment S4:305
BRUCE, R. E., Notes on sun-spots P13: 82
BRYANT, C. S., Aurora S1: 88
BUCHANAN, R., Approaching opposition of Mars P13:137
Art of computing P15:287
Constants for the equator P16:346
Differential calculus by means of finite differences P13:245, 309
Equinoxes of the planets P13:282
Planetary aberration P13:376
Semi-diameter of the planets P13:209
Synodic period of Jupiter and Saturn P16: 65
Using Professor Newcomb's planet tables P15:133
Visual brilliancy of the planets P13:175
BUMSTEAD, H. A., Josiah Willard Gibbs P11:446
BURCKHALTER, C., Disappearance of Saturn's rings P16:127
Observations at Cloverdale, California S8: 97
BURGESS, G. K., Value of the gravitation constant P10:421
BURNHAM, S. W., Astronomy in Russia A2:595
Barnard, E. E. P1:193, 341, 441
Binary star systems, The P4:160
stars; β 416 and *Scorpii* 185 ..... S10:489
β 208 ..... A1:464
β 612 ..... A1:268
Bright-wire illumination for micrometers S1:110
Camera for celestial photography S10:325
ζ *Cancri*, System of A2:872

Volume and Page

BURNHAM, S. W., *(Continued)*
β Cassiopeiae, Companion to P8:540
Double star *γ Andromedae* S10:118
26 Draconis, β 962 ..... S8:356
ε Hydrae S8:207
β 107 ..... P7:1; P8:528
Σ 186 ..... S10: 72
A lost P11:250
measures at Royal observatory, Belgium P13: 15
observations at Cape of Good Hope P13:333
Flower observatory P10:129
observing S1:25, 73
orbit found by graphical method P1:243, 349
stars discovered at Washburn observatory S9:299
Ellipsograph and Protractor ..... P4:181; Cor. P4:336
Enlarging photographic lens A1:558
52 Herculis (β 627) A1:465
Hough Catalogue and re-measurement of double stars (E. Doolittle) P15:624
Hussey's measures of the 0 Σ double stars P9:553
Measures of 748 double stars S3: 07
Orbit of 9 *Argus* A3:290
ξ Aquarii, (Σ 2909) P4:474
Castor P4:286
35 Comae Bernices (Σ 1687) and 0 Σ 4 ..... P5:125
λ *Cygni*, 0 Σ 413 ..... P4:307
β Delphini (β 151) S10:215
τ Ophiuchi P4:347
Σ 1216 ..... P5:450
Σ 2107 ..... P5:449
0 Σ 215 ..... P4:543
0 Σ 285 ..... S10:273
Period of δ *Equulei* (0 Σ 535) S2:244
Place of Tycho Brahe's star S9:449
Poulkowa double star measures A3:354
Proper motion of components of *61 Cygni* S10: 1
β 182 ..... P8:530
β 612 ..... S10:323
Procyon A3:434
Σ 1321 ..... S10:168
Σ 1604 ..... A1:870
motions of double stars A3: 14
Recent double star work P14: 79
Researches in the evolution of stellar systems P4:471
Small vs. large telescopes S4:193
Struve double stars (Lewis) P14:523

XUM

Volume and Page

BURNS, G. J., Number of the stars P12:267
BURNS, K., Solar parallax by spectrographic observations of Venus P15:556
BYRD, M. E., Astronomy by the laboratory method in secondary schools P7:472; P10:131; P14:294
in the high school P11:550; P12:24, 199; P13:545; P15:227
First observations of the sun and moon P1:216, 252
Hints on popular study of astronomy S6:151
Laboratory for general astronomy P10:131
Plea for elementary astronomy P15: 25
Popular fallacies about observatories S5:263
Stars and the Milky Way P6:288
Winlock, Anna P12:254
CALLANDREAU, M. O., Comparison of minor planets and short period comets P12:117
Henry, Prosper P11:558
CAMPBELL, F., Auroral arch of Aug., 1903 ..... P15:448
Determining Sundays in February P11:167
Might a comet strike the earth? P8:253
Remarkable phenomenon P11:484, 575
CAMPBELL, W. W., *Aurigae*, Observations of Nova A1:715, 820, 881; A2:149, 417
Castor, a quadruple star P13: 87
Comparative power of the Lick 36-inch refractor P16:560
Earthquake of April 18, 1906, and Lick observatory P14:441
Hydrogen envelope of DM+30°3639 ..... A2:913
Mars' atmosphere P3:439
Normae, Observations of Nova A3:311
Solar eclipse of Aug. 30, 1905 ..... P12:456
Spectra of comets *b* and *c* 1893 ..... A3:571
Orion nebula and others A3:384, 494, 695
Spectroscopic observations of motions A1:319
Spectrum of γ *Argus* A2:555
Aurigae, Nova A1:799; A2:722
comet *a* 1892 (Swift) A1:698
Mars A3:752
Sun's distance obtained from observing *Eros* P9: 88
Wolf-Rayet stars A3:448
CAMPBELL, W. W., and C. D. PERRINE, Announcing satellite discoveries P14:135, 252
CARLISLE, C. W., Observations with a small telescope P12:328
CHALLICE, R., Are the planets inhabited? P11:417
CHAMBERS, G. F., History of astronomy S10:457
New general catalogue of stars S9:203
CHANDLER, C. H., Apparent size of the sun P7:342
Silvering glass mirrors A2: 93

Volume and Page

CHANDLER, S. C., Almucantar tests....S2:269
Astronomical work of W. L. Elkin....P3:392
Latest knowledge of the motion of the pole....P6:509
Life and work of Dr. B. A. Gould....P4:341
Planet DQ 1898, The name of the....P7: 26
Positions determined near plate borders....P7:286
Problem for beginners in cometary computation....P6:459
Rotation period of Venus and Mercury....P4:393
CHARROPPIN, C. M., Mirage....P5: 23
Stephen J. Perry....S9:197
Washington university eclipse party....S8:122
CHRISTIAN, I. E., Gegenschein, The....P9:146
Meteors and stellar scintillation....P1:414
Moon's secular acceleration....P7:329
Solar corona....P7: 28
Tidal friction and planetary rotations....P9:194
CHRISTIE, W. H. M., Micrometer for measuring astrophotographic plates....A2:588
Wire-intervals for transit instrument, Determination of....P15:302
CLARK, A., Autobiography....S8:109
CLARK, A. G., Great telescopes of the future....A2:673
Possibilities of the telescope....A2:319
CLARK, G., Value of photography for astronomical investigations....P9:294
CLARK, J. M., The English mile....S9:155
CLARKE, H. L., Life history of star systems....P3:489
CLERKE, A. M., Distribution of the stars....A2:515
Is star-strewn space infinite?....P4:431
New star in *Auriga*....A1:504
System of *ζ Cancri*....S9:300
Yale measurement of the *Pleiades*....S6:254
CLEVENGER, S. V., Optical appearances of comets....S6: 89
COAKLEY, G. W., Are comets ever repelled by the sun?....A1: 97
Comets, Additional points relating to....A1:652
Eclipses and occultations computed....S4:207
Nebular hypothesis of LaPlace....S7:132, 191
Orbit of a body approaching the sun....S10:305
Probable origin of meteorites....A1:753
Relation between a planet's rotation and revolution times....S10:217
Stability of the rings of Saturn....S9:3, 67
Tidal theory of the forms of comets....A1:177
CERASKI, W., Stellar magnitude of the sun....P14:226
COGSHALL, W. A., November meteors....P7: 71
COIT, J. B., Aurora of Aug. 21, 1903....P11:534
Solar prominence....P12:455

XUM

Volume and Page

COLBERT, E., Intra-Mercurial observations....S6: 84
Motion of lunar apsides....S6: 49
COLLINS, F. H., Cyclone theory of sun-spots....A1:826
COLTON, A. L., and J. M. SCHAEBERLE, Parallax of a meteor determined by photography....P5:232
COMMON, A. A., Address on astronomy....P8:417, 496
before Royal Astronomical Society....P5: 1
Photographs of nebulae....S8: 25
Silvering glass mirrors....A1:852
Two large telescopes....A2: 11
COMSTOCK, G. C., Aberration and atmospheric refraction of light....A3:339
Adjustment of a sextant....S7:129
Atmospheric refraction at Madison, Wis....A2:769
S. W. Burnham on double stars....S10:277
Constants of refraction and aberration....S6:310
Defects of sensitive levels....S10:299
Double star observations....S9: 78
Efficiency of a small instrument....S10:406
Establishing a meridian line....P9:246
Graphical representation of a comet orbit....P6:465
Lick observatory meridian circle....S5:225
Motion of comets when far from the sun....P10:169
Problems in the astronomy of precision....P4:457
Refraction in zenith distance....S9:186
Saturn's rings....S10:468
Significance of the star-ratio....P15:131
Sun's motion referred to group of faint stars....P12:112
Time and latitude determined from equal altitudes of stars....P11:238
Value of one revolution of a micrometer screw....S7:343
Correction....S7:409
COOKE, W. E., Device for facilitating meridian circle transitings....P10:365
Obtaining time, latitude, azimuth accurately for field-work....P11:169
Perth catalogue of 420 standard stars....P16:192
observatory meridian work....P15:499
COPELAND, R., Naval observatory....S3:270
Nova in *Auriga*....A1:593
Grant, Robert....A1:878
Mars satellite, Pretended early discovery of....A1:553
Smyth, C. Piazzi....P8:384
CORDEIRO, F. J. B., Atmosphere....P13:384
Color-Perception....P16:609
Gravitation....P13: 8
Gyroscope....P15:81, 146
CORNU, A., Study of diffraction gratings....A3:207

Volume and Page

CORRIGAN, S. J., An astronomical theory of the molecule and an electronic theory of matter—
.....P15:585; P16:25, 98, 148, 300, 367, 411, 493, 533, 619
Comet meteor streams.....S5:145
Constitution and function of gases.....P4:247
Effects of collision between asteroids.....A2:207, 304, 474
rotation upon the fluid envelope.....S7:369, 420; S8: 49
Intra-Mercurial planets, Conditions of visibility of.....P5:89, 139
Probability of four.....P4:414
Longitude from sextant observations.....S6:175
Meteoric orbits and radiants.....S5:33, 100
Probable origin of comet Holmes.....A2:24, 99
Radiant energy, Probable effects of.....A1:362
through gaseous media, Transmission of.....A1:1, 108
Rotation time a function of density.....S8:210
Simonton, T. D.....P16:466
Surface temperatures of Mars, Venus and Mercury.....P16:258
Theoretical parallax of the *Andromeda* nebula.....P16:256
CORTI, J. S., Simultaneous determination of latitude and azimuth.....S10:189
CORTIE, A. L., *Auriga,* Temporary star in.....A2:521
Chromosphere line Angström 6676.9.....A1:135
Problems of solar physics.....P15:173
Studies on the solar spectrum.....A1:393
Sun-spot group of 1891.....A1:130
positions measured by Stonyhurst disks.....P16:426
spectra.....A1:587
COURVOISIER, L., Leo de Ball's refraction tables.....P15:456
COX, H. J., Recent studies in the solar constant.....P13:147
CRAWFORD, R. T., Computing elements of asteroids from daily motion
.....P14:397
and W. F. MEYER, Orbit of Jupiter's satellite VIII.....P16:491
CRAWLEY, E. S., Solar heat-and gravitation.....S7:325
CREW, H., Concave grating to study stellar spectra.....A2:156
Gravity with altitude, Variation of.....A3:404
Light, Theoretical and Practical by R. T. Glazebrook.....A3:402
Measurement of solar prominences.....A1: 90
Method of obtaining color curve of a lens.....A1:933
Pringsheim on Kirchhoff's law.....A1:581
Radiation of heated gases.....A3:587
Theory of optical instruments, C. Czapski.....A3:241
Spectrum of Nova in *Auriga*.....A1:231
sun-spot group, February, 1892.....A1:308
CREW, H., and R. TATNALL, Mapping the spectra of metals.....A3:741
CROMMELIN, A. C. D., Announcing discoveries of satellites.....P14:147, 380
Astronomical work for 1905.....P14: 11
New planet TG.....P14:472

XUM

Volume and Page

CROOKES, W., Recent advances in science....P6:493; P7: 3
CROWL, G. M., New earthquake theory objectionable....P16:394
CURTIS, R. H., Reduction of radial velocity spectrograms....P15: 68
CUTLER, MARY B., The Superstructure....S5:267
DANIEL, Z., Comet *c* 1898 (Coddington)....P6:358
and H. N. RUSSELL, Venus as a luminous ring....P15:516
DARWIN, C. H., Evolution of double stars....A2:413
d'AURIA, L., Constitution of the ether....P15:101
Kinetic theory of gases....P15:210
and correctness of equations Errors, in....P15:357; P16:241
Relation of mass of universe to stellar dynamics....P12: 20
between speed of stellar motion and velocity of wave propagation bearing on the nature of ether....P11:254
DAVIDSON, G., Intra-Mercurial planets....S3:113
Meteors, Nov. 23, 1892....A2: 86
Occultation of *Aldebaran*....S6:195
α Tauri....S6: 45
Vision, Limits of....P10:111
DAVIS, H. S., Allen, Richard Hinckley....P14:593; P16:189
Calculating machines....P4: 20
Computing transit factor tables....P10:303
Concise knowledge library,—Astronomy, A. M. Clerke....P6:190
List of stellae novae....P9:284
Notes on mathematical symbols....P5:402
nomenclature of some Piazzi stars....P13:423
Outline of the history of astronomy....P6:455
Parallaxes and connection of 61 and 61^2 *Cygni*....P6:487
Rittenhouse, D.,....P4: 1
Women astronomers....P6:129, 211, 220
DAWSON, W., Number of sun-spots....S3:171
DEAN, J. C., Story of Halley's comet....P16:331
DENNING, W. F., Astrographic chart....P5: 62
Chief discoverers of comets....S9:235
Comet and meteor observations....P10: 59
1862 III? Who discovered....P7:15; Cor. P7:105
Fireball....P5:167
Jupiter, Dark spot on....P7: 14
Motion of the red spot on....S9:140; P11:4, 460; P15:398
Red spot on....S5:62, 281; P9:488; Cor. P10: 56
Markings and rotation Period of Saturn....P12: 40
Mercury as a naked eye object....P8:202
Meteors....S9:141; P15:168
Heights of....S8:299
Paths of brilliant....P10:121
Meteor radiants....S9:438; S10:234; A3:600, 872
showers....S5:61, 106, 167; S6:160, 287, 356; S7:447; P16:198

Volume and Page

DENNING, W. F., *(Continued)*
Meteoric observations P13: 107
Naked eye comets P15: 411
Planetary observation P11: 19
Shooting stars P1: 34, 67, 97, 147, 208, 267, 296, 336, 345, 438
and aerolites, Nature of A1: 481
Small vs. large telescopes S4: 259
Telescopic meteors P15: 170
DENT, E. A., Herschel, Caroline P11: 123
DESLANDRES, H., Radial motion of the stars with siderostat A1: 157
Remarkable prominence A1: 502
Solar atmosphere A1: 60, 314
Spectra of sun and Nova *Aurigae* A1: 712
DEWAR, J., Liquefaction of gases and low temperatures P10: 469, 531; P11: 8, 79, 117
and C. D. LIVEING, Spectra of flames A1: 215
and metallic compounds A2: 434
Spectrum of liquid oxygen A1: 705
DINWIDDIE, W. W., Conducting electric circuits to the eye end of an equatorial P10: 300
DIXON, S. M., Photo-electric effect of starlight A1: 844
DOLE, R. M., Perseid meteors P10: 499; P13: 347
and Lyrid meteors, 1903 ..... P11: 514
DONAGHE, H. R., Photographic flashes from Harvard observatory P6: 481
DOOLITTLE, C. L., Flower observatory of Pennsylvania university P5: 122
Longitude by moon culminations S4: 231
Ring micrometer observations of comets Fabry, and Barnard S5: 256
Some observatories and observers P11: 467
DOOLITTLE, E., Discovery of an unseen body, F 70 *Ophiuchi* P3: 329
Effect of refraction on the measures of double stars P5: 143
Lost double star P13: 398
Perfection of mounting of great telescope P7: 149
Results of Helmholtz's theory of solar contraction P3: 21
Variation of latitude P3: 105
Wharton reflex zenith tube P14: 530
DOUGLASS, A. E., Almucantar, A new P11: 252
Ascent of Popocatapetl P5: 505
Astronomer's globe P5: 57
Atmosphere, telescope and observer P5: 64
Comet 1892 I (Swift) A2: 202
Effect of mountains on atmosphere P7: 354
Gegenschein observations P2: 29; P5: 178
Jupiter, Disks of its satellites A3: 517
Drawings of satellite III P5: 308
Surface markings P8: 473

XUM

Volume and Page

DOUGLASS, A. E., *(Continued)*
Lowell observatory and its work P2: 395
in Mexico P4: 489
Mars P7: 113
Lick review of P4: 199
Polar cap of A3: 738
Predictions of projections on terminator of P11: 24
and planetary work P7: 74
Persei, Nova P9: 263
Scales of seeing P6: 193
Stellar bands in the zodiac from *Gemini* to *Scorpio* P5: 511
Zodiacal light, Photographs of P8: 174; P9: 190
DOWNING, A. M. W., and J. J. STONEY, Ephemerides for two situations in the Leonid stream P7: 403
Perturbations of the Leonids P7: 227
DREW, D. A., Calendar for Mars P4: 417
DUNER, D. C., Is there oxygen in the atmosphere of the sun? A3: 215
DUPUY, A. B., Reflectors vs. refractors S8: 88
EADIE, J. H., *Andromeda* nebula S4: 298; S5: 79
Meteor observations S5: 317
Star colors S7: 210
EASTMAN, J. R., Longitude and latitude of the new Naval observatory A2: 699
Neglected field of fundamental astronomy A2: 126, 315
Transits of inferior planets S2: 182
EASTON, B. S., Sun-dial of Ahaz P7: 242, 277
EBERT, H., Electro-magnetic theory of the sun's corona A2: 804
Spectra of new stars P12: 239
EDDIE, L. A., Meteor trail seen at Grahamstown, Oct. 22, 1895 ..... P3: 271
Spectrum of γ *Argus* P3: 123
Lunar eclipse of March 11, 1895 ..... P2: 449
EDGECOMB, D. W., Notes on the invention of the telescope P7: 184
Performance of a 6¼ inch binocular P10: 523
Reflectors P2: 366
Teneriffe, Alte Vista, Leyde S9: 392
Visit to Slough S9: 52
EDMUNDS, J., The twentieth century P8: 140
ELCHARWICH, F., Lunar cusps with the horizon P7: 52
ELKIN, W. L., Instrument for photographing meteors A3: 626, P2: 17
Mean parallax of first magnitude stars S7: 395
Velocity of meteors from photographs P7: 441
ELLIOTT, S. B., New system of mounting a telescope at Amherst P10: 463
ELLIS, J. T., Star of Bethlehem S6: 360
ELY, O., Is the universe infinite? P16: 435
ENGLEHARDT, B. von, Total solar eclipse of 1887 ..... S7: 161
ENNIS, J., Center of sidereal system S2: 113
Colors in the solar corona S6: 273

XUM

Volume and Page

ENNIS, J., *(Continued)*
Electric phenomena in solar system....S5:234
Total solar eclipse of August 1887....S6:105
Two problems in sidereal astronomy....S2: 67
ESPIN, T. E., Spectrum of α *Herculis*....A3:651
EVANS, H. B., Orbit of Δ 15....P7:306
EVERSHED, Jr., J., Distribution of solar prominences, 1891....A1:426
Faculae and prominences photographed....A2:628
Parallax of the gegenschein....P7:289, 352
Solar prominence photography....A1:827
EWELL, M. E., Underwood observatory....S10:519
FAULHABER, C., Construction of large telescope lenses....P13:534
FATH, E. A., Comet *a* 1901....P9:289
Northern limit of the zodiacal light....P16:633
FEATHERSTONE, W. B., Photographing the corona....P8:250
FENYI, J., Solar prominence, 1892....A1:609; A2: 37
Enormous velocity of the....A1: 63
Sun-spot group, Phenomena observed on....A1:430
Two great protuberances....A3:122
FERGUSON, R. H., Sun-spots for 1885....S4:238, 261
FERREL, W., Variable star *Algol*....A2:429
FERRY, E. S. and E. P. LEWIS, Infra-red spectra of metals....A3:747
FICKLIN, J., New proof for differentials....S2:209
FITZGERALD, G. P., Existence of all-pervading ether proved....S7:386
FIZEAU, M., Aberration of light and solar prominences....A1:126
FLEMING, M., Stars having peculiar spectra....A1:27, 418, 765; A3:501
Novae in *Aquarius* and *Delphini*....S10:106
Perseus, Triangulum, and *Hydra*....S10: 7
FLEMING, Mrs. M., Field for woman's work in astronomy....A2:683
FOERSTER, W., Hencke, Karl Ludwig....S10: 20
and O. JESSE, Observations of night clouds requested....A1:859
FOLIE, F., Peters' observations treated by Chandler....A2:874
FOWLER, A., Approaching total eclipse of the sun....P4: 28
FOURIER, BARON, Historical eulogy on LaPlace....P3: 1
FRANKS, W. S., Roberts, Isaac....P12:469
FRIC, J., and FR. NUSL, Communication about the diazenital....P13: 16
FRISBY, E., Comet *b* 1882, (1882 II)....S2:188
Transit of Venus....S1:182
FROST, E. B., Photometric observations of the planets....A2:619
Potsdam spectrograph....A2:150
Relative activity in two solar hemispheres....S9:109
Thermal absorption in the solar atmosphere....A1:720
Total solar eclipse of May 28, 1900....P8: 86
Unit of velocity in the line of sight....A3:160
FURNESS, C. E., Photographic catalogue of north polar stars....P9: 1
Scientific value of total lunar eclipse....P3:199

XUM

Volume and Page

FURNESS, C. E., *(Continued)*
Tycho Brahe P3:221
FURNESS, H. H., Jr., Equation of Cartesian co-ordinates S9:200
GERRISH, W. P., Break-circuit for clocks S9:124
Transit observations by photography S9:111
GETMAN, F. H., The ether P7: 86
GIBSON, F. M., Care of the telescope P1:412
GIBSON, W., Number of the stars P14:594
GILBERT, B. D., Peters' celestial charts S1:288
GILL, D., Extracts from presidential address P15:467, 528
GILL, W. J., Jr., Variable stars P4:434
GILPIN, C., Jr., Approximation of greatest root of cubic equation with 3 real roots P14:641
GLASENAPP, S., New variable star in *Aries* A2:503
Orbit of binary 20 *Persei* = β 524 ..... A2:499
β 416, (*Scorpii* 185) A2:402
double star O Σ 224 ..... A2:702
β 612 ..... A1:466
GODDARD, H. C., Subdividing the surface of a sphere into congruent parts P10:406
GOODENOW, S., Velocity of sound S8:307, 382
GORE, J. E., Astronomical facts and fallacies P16:525
Brightness of starlight P9:506; P10:227
Companion of *Algol* P12:359
Immensity and minuteness P10:225
New cosmogony P14:515
Orbit of binary O Σ 224 ..... A3:559
70 *Ophiuchi* S10: 45
Spectra of stars in the Milky Way A1:326
of large proper motion A1: 11
GORE, J. H., How the earth is measured A2: 26
GRAFF, K., Variable star observations at Hamburg P13:514
GRAY, B. L., and W. E. WILSON, Effective temperature of the sun A3:382
GREGORY, R. A., Spectroscope in recent chemistry P3: 70
GRIFFITHS, H. F., Physical aspect of Jupiter in March, 1896 ..... P4: 25
GRIGGS, H. W., Brilliant meteors P14:571
Lantern projection distances P15:316
GRUBB, H., Good astronomical telescopes S7:106
GURLEY, W. C., Electrical control of equatorials in photography A3:641
HADDEN, D. E., Auroral phenomena at Alta, Iowa P10:249, 388
o Ceti observations P7:105
Grating spectroscope for small telescope P3:84, 152
Large sun-spots in 1903 ..... P11:560
Solar observations .....
P7:408; P8:222; P10:254, 348; P11:488; P13:196; P14:603; P15:607
Spectroscope for small telescope P12:252

XUM

Volume and Page

HADLEY, S. M., Masses of binary stars P11:240; P13:260, 323
HAGEN, J. G., Atlas of variable stars P5:20; P7: 85
Chart and catalogue for observing Nova *Persei* P9:191, 279
Deflection of the level S3:75, 107
Kepler's correspondence S6:109, 133, 212
Laws of falling bodies S4: 15
Lunar eclipses as problems for students S3: 46
HALE, G. E., Astronomical work with inexpensive apparatus ... P16:74, 167, 438
Astrophysical Journal A1:17; A3:831
Heat radiation of the stars P7:503
Kenwood physical observatory S10:321
Magnesia fluting in connection with spectra of the nebulae S10: 23
Pending problems in spectroscopy S10: 89
Persei Nova P9:264
Photographic study of the sun A1:811
Photographing the solar corona without an eclipse A2:260; A3:662
Photography and the invisible solar prominences S10:257
Solar disturbance A1:611
faculae A2:450, A3:113
observatory mirror P14:557
work P15:563
photography at Kenwood observatory A1:407
prominence photography A1: 70
and terrestrial phenomena, Coincidence of A2:167
Spectroheliograph A2:241
and solar phenomena A1:603
Spectroscopic observations of sun-spot group, Feb., 1892 ..... A1:310
Sun's surface and terrestrial magnetism A1:917
Ultra-violet spectrum of the solar prominences A1:50, 602, 821
Yerkes observatory of the university of Chicago A1:790
HALL, A., Aberration and solar parallax S2:165
Clairaut's theory of the figure of the earth P9: 60
Commensurability of motions S4:200
Determination of orbits P13:353
Elliptic motion P13:287
0^2 *Eridani* S1: 94
Euler-Lambert equation for parabolic motion P8: 2
Gould, B. A. P4:337
Images of the stars S5: 97
Note on multiplication P9: 31
Parallax of α *Lyrae* and 61 *Cygni* S2: 1
Photographs of occultations of Mars, 1892 ..... A1:610
Planet DQ, 1898, (*Eros*) P6:567
Plus probans quam necesse est P7: 13
Rejection of discordant observations S6:297
Resisting medium in space S8:433

XUM

Volume and Page

HALL, A., *(Continued)*
Rule for squares of consecutive numbers P9: 161
Sketch of theoretical astronomy P5: 9
Spheres of activity of the planets P7: 180
Transformation of differentials of area and volume P10: 5
Work of astronomy S4: 97
HALLEY, E., Elogy on Sir Isaac Newton P12: 504
HALSTED, G. B., Astral geometry P9: 187
Non-Euclidean geometry .. P7: 482, 519; P8: 8, 189, 267; P9: 555; P10: 26, 176
HANCOCK, A. B., LaPlace on latitude variations P2: 349
HANCOCK, H., Ptolemy's argument against the rotation of the earth ... S9: 293
HARKNESS, W., Astronomical photography with commercial lenses A1: 641
Comets' orbits represented by models S6: 329
Magnitude of the solar system A3: 605
Method of measuring faint spectra S1: 52
Total solar eclipse, 1887 ..... S7: 1
Transit of Venus S1: 143
HARMON, O. E., Astronomy of Shakespeare P6: 232, 263, 321
Great circle on the celestial sphere P4: 555
Lesson in parallax P1: 403
Mitchel, O. M., ("Old Stars") P5: 413
Position of the earth's axis P2: 219
Twilight P4: 148, 211, 252; P5: 257
HARMS, C. F., Novel observatory P12: 73
HARPHAM, F. E., Angle-measuring instruments P13: 149
Hints for a small telescope P2: 106
Martin's "The Friendly Stars" P15: 384
Rutherfurd photographs P8: 129
HARRINGTON, M. W., Polarization of light of the asteroids S3: 79
Tools of the astronomer S2: 248, 261, 297
HARRISON, H., Intra-Mercurial planets S3: 135
HARTLEY, W. N., Line in the spectra of the elements A1: 223
HARVEY, A., Aurora and zodiacal light P10: 332
Study of terrestrial magnetism P9: 467
HASSARD, A. R. J. F., Aurora P15: 256; P16: 455, 517
Occultations of the moon in *Praesepe* P16: 328
Venus observation P16: 459
HASSELBERG, B., Index of refraction and dispersion of air A2: 455
Line spectrum of oxygen A3: 760
Spectroscopic investigations at Royal Swedish academy A1: 793
Spectroscopy of sulphur A2: 347
HASTINGS, C. S., Comet Cruls, *b* 1882, (1882 II) S1: 171
Construction of telescope objectives S1: 244; S2: 39
History of the telescope S10: 335
Objections to the theory of the corona S2: 307
Phenomena of Venus' transit S1: 273

Volume and Page

HAYES, E., Path of the shadow of a plummet bead P16: 279
HAYES, L. D., Mirage from blast furnaces P16: 321
HAYWOOD, J., Annual motion of the earth S7: 286
Electric phenomena in solar system S5: 81
Tangent Index S5: 270
Visible shadow of the earth S4: 243
HAZEN, H. A., West Indian hurricanes and solar magnetic influence A3: 105, 443
HENKEL, F. W., Halley's comet P15: 238
HERVEY, A. B., Northern lights P15: 446
HESS, F., Transit of Venus, 1882 ..... S1: 153
HESSE, F. H., Sun-spots and magnetic storms A1: 615
HIGGS, G., Geometrical construction of absorption lines in solar spectrum A2: 547
HILL, C. B., Reducing observations made with a transit A2: 212
HILL, G. A., Brorsen's short period comet A1: 7
Finding a focal point of a lens of long focus P11: 379
New form of comet-seeker S7: 241
Requisites of a transit observer P13: 362
Search for Comet 1892 III, (Holmes) A3: 324
Untried method of determining the constant of refraction P13: 417
HIMES, C. F., Making of photography P8: 26
HINKS, A. R., *Eros* and the solar parallax P11: 439
Reduction of 295 photographs of *Eros* P12: 531, 589
HIRAYAMA, S., Maxima and minima of sun-spot periods P15: 188
HOBBS, W. H., Goldschmidt law applied to the solar system P15: 345
HODGINS, G. S., Concerning the earth's motions P8: 60
HOLDEN, E. S., Among the stars P8: 531
Figure of nucleus of comet 1882 II, Gould S1: 278
Lick eclipse expedition, 1889 ..... S8: 339
observations of Mars 1892 ..... A1: 663
observatory astronomical work P5: 181
telescope S7: 49, 296
Mercury's rotation period S9: 167
Meridian circle at Strassburg S3: 199
Orion nebula, Central parts of the S2: 77
Photography of the planetoids P3: 343
Saturn and his satellites S8: 1
Search for Neptune, 1845-6 ..... A1: 287
Stars for time determination S1: 124
Stellar magnitudes by photography S9: 12
HOLMES, E., Limits of vision P9: 499
Planet Neptune P16: 9
Shadow-bands P15: 77
Suggested origin of comet Holmes A2: 370
HOLT, J. R., Canals of Mars A3: 347
Cause of the gegenschein P2: 94
Polar snows and non-glaciation of Mars P2: 78

XUM

Volume and Page

HOLT, J. R., *(Continued)*
Solar image reflected in seas of Mars A3:257
Spectroscopic determination of stellar rotation A2:646
HONEY, F. R., Eight-centered oval and ellipse P16:617
HOOKE, R., Ring formation, The theory of A2:766
HOOPER, J. R., Atmospheric conditions S3:230
Formation of sun-spots S7:397
Seas of Mars P4:300
HOPKINS, B. J., Hints to observers of Saturn S4: 49
HORNSBY, W. L., Chinese calendar P10:229
HOUGH, G. W., Chronograph, Electrical connections for operating a A3:184
A printing S5:161
Comet *a* 1882, (Wells) (1882 I) S1: 96
Dearborn observatory S8:341
Doolittle's measures of Hough double stars P16:478
Equatorial, Electrical control of A3:524
Observing seat for S1: 47
Illumination for a position micrometer S9:161
Jovian phenomena P11:207
Jupiter P2:145; P3:519; P8:381; P10:393
Physical constitution of A3:89; P11: 63
Present knowledge of the surface of P13: 19
Red spot on S4:289; S6:325; S10:378
Rotation of the surface of P7:62; P11:114
Spots and markings of A1:193
Occultations of stars by the moon, Computation of P5:451
On an infinite universe P16:461
Rotation of domes S2:133
World's congress auxiliary A1:462
HOUGHTON, S., Evolution of the earth S1:147
HOWARD, C. P., Determining apparent orbits of binary stars A3:425
Total eclipse of the sun, May 28, 1900 ..... P8:550; P9: 18
Aug. 30, 1905, at Burgos P13:542
HOWE, H. A., Adjustment of a small equatorial P3:131, 193
Astronomical books for the use of the student P9:29, 61, 169, 225
Comet *b* 1882, (1882 II) S3: 97
Earth tremors S8:448
Eclipses computed by students S4:205
Experiments in electric lighting A2:505
Galileo, his life and works, (J. J. Fahie) P12: 80
Habitability of other worlds S4:294
Logarithmic computations S2: 45
Occultation of *Aldebaran* P13:108
Place and function of astronomy in education P6:369
Pleasures of the telescope (G. P. Serviss) P9:286
Practical astronomy, (C. L. Doolittle) S5: 63

Volume and Page

HOWE, H. A., *(Continued)*
Teaching of descriptive astronomy P4: 225, 363
20-inch equatorial of Chamberlain observatory A3: 709, 826
HUGGINS, M. L., Astrolabe P2: 199, 261; A3: 793
HUGGINS, W., Limit of solar and stellar light S9: 22
Photographing the solar corona without an eclipse S1: 282
Solar corona S4: 136, 167
Spectrum of Nova *Aurigæ* A2: 349, 609
Comet Wells, (1882 I) S1: 114
Mars A3: 771
Orion nebula S9: 303; A3: 568
Sirius S9: 318
Tulse Hill spectroscope A2: 615
Visual appearance of Nova *Aurigæ* A3: 314
HUGGINS, MR. and MRS. W., Nova *Aurigæ* A1: 571
Photographic spectra of Uranus and Neptune S8: 450
Wolf-Rayet bright-line stars in *Cygnus* S10: 49
HUNT, T. S., Cosmic physiology S1: 50
HUNTINGTON, G., Hymn S5: 268
HUSSEY, E. F., Recent eclipse in Egypt P14: 129
HUSSEY, W. J., Comet *b* 1893, (Rordame) (1893 II) P2: 445
Photographs of A2: 651
i 1898 (1898 V), Orbit of P6: 556
Comet photography and Rordame P2: 353
Observations of Struve double stars P7: 153
HUTCHINS, C. C., Determination of the eccentricity of a sextant P11: 353
magnifying power of eye-pieces S8: 326
Pair of ancients S10: 214
Platinum on glass mirrors A3: 858
Ptolemaic and Copernican systems of Galileo P12: 442
Quartz fibre S9: 90
ILIFF, E., and L. WATERBURY, Group of time stars for amateurs P2: 74
INNES, R. T. A., On interpolation P9: 389
IRISH, C. W., Total solar eclipse, 1889 ..... S8: 166
JACOBY, H., Astronomer's pole P9: 177
Astrophotographic chart A2: 117; P3: 211
Cape of Good Hope observatory P3: 217
Faith and the fourth dimension P16: 298
German variation of latitude work A1: 471
Rees, John Krom P16: 639
JAMES, G. O., Professor Obrecht's catalogue P16: 432
Reducing time observations with an engineer's transit P15: 475
Time obtained with a surveyor's transit P13: 499
JANSSEN, J., Age of the stars S7: 202
Eclipse of May 6, 1883 ..... S2: 179
Theory of the sun, by A. Brester, Jr A3: 238

XUM

Volume and Page

JENKS, A., Reversed curvature of the shadow of Saturn's rings.....S9:255
JESSE, O., and W. FOERSTER, Night cloud observations requested...A1:859
JEWELL, L. E., Object glass grating.....A3:44, 155
Scales of intensity for lines of solar spectrum.....A2:815
JOHNSON, H. A., Dearborn observatory.....S7:381
JOHNSTON, W. H., Criticism of "Faith and the fourth dimension"....P16:615
JONES, G. L., 7609 τ *Cephei*.....P9:408
Persei Nova P9:573
JONES, G. S., An alt-azimuth mounting.....S10:506
Are there possible Martians?.....P9:234
How to make a lens.....S10: 68
Polishing and grinding a telescope mirror.....S9:353
Position of north pole of Mars.....P10: 55
Visibility of Mercury.....P9:367
JOURDAIN, P. E. B., Results from principle of conservation of energy P13: 36
KAPTEYN, J. C., Motion of nebulae near Nova *Persei*.....P10:124
KAYSER, H., Spectra of comets.....A3:204, 586
influenced by slit-width.....A3:367
and C. RUNGE, Spectra of the elements.....A2:802
KEDZIE, J. H., New theory of solar heat and gravitation.....S7:438
KEELER, J. E., Central star of Ring nebula of *Lyrae*.....A1:824
Chromatic aberration of telescopes.....A3:157
Comet *b* 1893, (1893 II).....A2:650
Efficiency of spectroscopes for astronomical purposes.....S10:433
Electrical contact apparatus for astronomical clocks.....S7: 9
Jupiter occultations S8:221
β *Lyrae* A2:350
Magnesium spectrum an index to star temperature.....A3:660
Modern spectroscope of Alleghany observatory.....A2: 40
Nebular hypothesis A1:567, 768
Occultation of Mars, Sept. 3, 1892.....A1:831
Ring of light around Venus.....S1:292
Rock-salt for polishing.....S5:222
Saturn observed with Lick equatorial.....S7: 79
spectroscopically P2:443
Short focus camera an advantage in spectrum photography.....A3:772
stellar spectrum photography....A3:857
Spectra of *Orion* nebula and *Orion* stars.....A3:476
Spectroscope and some of its applications.....P1:9, 102, 169, 200; P2: 20
Spectrum of Comet 1892 III, (Holmes).....A2:272
P *Cygni*.....A2:361
nebulae S10:264
Star spectroscope of Lick observatory.....A1:140
Stellar spectra by Professor Lockyer.....A3: 59
Time service at Lick observatory.....S6:233
Translation of Scheiner's "Die spectralanalyse der gestirne," (E. B.

XUM

Volume and Page

KEELER, J. E., *(Continued)*
Frost) A3:688
Wave-lengths in spectrum of nebulae A2:733
KELVIN, LORD, Sun's effect on terrestrial magnetism A2: 74
KEYSER, DIRECTOR, Division errors of meridian circle S3: 33
KIMURA, H., Six years' cycle of the polar motion, 1891-1902 ..... P12:270
KING, J., Total eclipse of the sun, 1893 ..... A1:863
KIRKWOOD, D., *Arcturus* P1:248
Asteroid zone, Gaps in S3: 6
Asteroids S6:116; A1:785
and their relation to the planetary system P1: 19
Asteroidal orbits S6:169; S8:305
August meteors S1:141
Comet 1866 and November meteors S4:225
Commensurability of motions S4:257
Heavenly bodies P1:205
Meteoric astronomy A2:385, 789; A3:188
Motions of Jupiter, Saturn and minor planets A2:302
Origin of comets S6: 77
Relation of aerolites to shooting stars S6:248
short period comets to asteroid zone S7:177
Stability of nebulous planets S4: 64
KLOTZ, O. J., Alaska boundary survey P3:348, 395
Latitude by elongation P3:199
Transmission of time P15:129
KLUMPKE, D., Measurements at the Paris observatory A2:783
KNIGHT, W. H., Some telescopes in the United States S10:393, 475
KONIG, E., Non-screen orthochromatic and panchromatic plates by bathing P15:620
KRETZ, W. C., Stars in *Coma Berenices* P9: 75
KREUTZ, H., Comets of the year 1906 ..... P15:421
KRUEGER, A., Schoenfeld, Edward S10:275
LAMASTER, W. H., Growth and magnitude of the sidereal heavens P3:226
LAMB, A. M., Change of latitude S4:129
Determination of latitude S5:179
LANGLEY, S. P., Amount of atmospheric absorption S3:267
Dust envelope S3: 21
New Spectrum P9:415
Observation of sudden phenomena S8:291
Solar and auroral coincidence S1: 55
Winlock, William C P4:351
LANNEAU, J. F., Approach of sun-spot maximum P12: 67
Eclipse phenomenon P9: 67
Physics of shooting stars P13:434
Source of the sun's heat P14:410
Sparsity of the stars P15:390

XUM

Volume and Page

LANNEAU, J. F., *(Continued)*
Sun-spots in July, 1903 ..... P11:372
LARKIN, E. L., Leonids observed in southern California P10: 16
Mount Lowe Railway observatory P9:359
Stellar floor P10:252
LAVES, K., Adjustment of the equatorial telescope P8:424, 535; P9: 13
Ancient astronomical instrument P8:492
Arc method for descriptive astronomy P14:217
Attempts to replace Newton's law of gravitation P5:513
Computing a planet's anomaly and radius vector P16:189
Graphic method for lunar eclipses P15:533
New light from old records P14:276
LEAVENWORTH, F. P., Mercury surface undisturbed by earth tremors A3:597
Parallax of 0. Arg. 14320 ..... A2:206
Personal error in position angle observations S10:116
Proper motion of some double stars S8: 77
Telescopes, large vs. small S9: 47
LE CHATELIER, H., Temperature of the sun A1:517
LEMAN, M., On a new pendulum escapement A2:882
LÉON, L. G., Leonids observed in 1902 ..... P11: 53
Mars and Saturn, in conjunction P12:147
Moon observations P11:276
Solar activity P12:66, 284
Sun-spots in December, 1903 ..... P12:216
Venus and Jupiter in conjunction P11:160
LEONARD, W. L., Drawings of Mars P15:387
LEPPER, G. H., Nature of markings on Mars P13:130
LEUSCHNER, A. O., Determining orbits from three observations P13:296
LEWIS, E. P., and E. S. PERRY, Infra-red spectra of metals A3:747
LINDSAY, T., Astronomical myths P6:139, 405; P7:181
First lessons in navigation P5:126
Occultation phenomena P6:524
Science by co-operation P4: 84
Theory of probability P4:240
LIVEING, G. D., and J. DEWAR, Spectra of flames A1:215
metallic compounds A2:434
Spectrum of liquid oxygen A1:705
LOCKYER, J. N., Photographic spectrum of *Orion* nebula A3:574
Spectrum changes in *β Lyrae* A3:575
Sun and his system P9:123
LOCKYER, W. S. J., Magnetic storms, aurorae and solar phenomena ... P11:552
LOEWY, M., *Eros* observations P8:488
International astronomical conference P9:393
Trépied, M. C P15:519
LOOMIS, E. F., Meteors seen at Dumont, Iowa P16:394
LORD, H. C., Solar disturbance A1:738

XUM

Volume and Page

LOVE, J. L., First college observatory in the United States.....S7:417
LOWELL, P., Brontes, a study in Martian canal development.....P13: 1
Chart of faint stars visible at Lowell observatory.....P13:391
Double canals and separative powers of glasses.....P12:575
Expeditions for ascertaining observatory locations.....P11:144
Kind of eye needed for detecting planetary detail.....P13: 92
Manner of making the polar cap of Mars.....P11:369
Markings in Syrtis Major.....P4:289
Mars, Double canals of.....P5:234
North polar cap of.....P4:202; P15:416
Rifts and arctic canals on.....P10:113
photographed.....P13:479
Supposed signals from.....P10:185
Means of sharpening photographic image applied to Mars.....P15:612
Mercury.....P4:360
Micrometric measures of the diameters of Mars.....P3:287
Rotation of Jupiter.....P11: 1
Standard scale for telescopic observation.....P11:34, 218
Thoth and the Amenthes.....P13:251
Tores of Saturn.....P16:133
Transit of Mercury.....A3:865
Venus, 1903.....P12:184
Rotation period and surface of.....P4:281, 389; P11:426
LUMSDEN, G. E., Popular astronomical observatory.....P7:307, 371
LYNN, W. T., Arago on Newton.....P12:626
Eclipse of Agathocles.....P13:201
Thales.....P9:577
Sirius' color in ancient times.....A1:634
Solar spots and their theories.....P14: 90
MACDOUGAL, D. T., Life on other worlds.....P7:420
MACPHERSON, H., Jr., Clerke, A. M.....P15:165
Construction of the heavens.....P14:385
Copeland, Ralph.....P14: 1
Distribution of the stars.....P15:400
Janssen, P. J. C.....P16: 72
Observatories of Scotland.....P15: 65
Scottish astronomy.....P14:206
Tacchini, Pietro.....P13:306
Two Scottish astronomers of to-day.....P16:397
Vogel, H. C.....P15:453
MAHILLON, L., D'Arrest's comet.....S2:145
MANIE, H. C., Red light.....S5:237
MANN, N. M., 61 *Cygni*.....S2:18; S10: 13
Handy micrometer.....S3: 10
Sirius.....S2:136; S7:25; P4:482
Three interesting binaries.....S9:385

XUM

Volume and Page

MANSON, M., Climate of Mars P2:371
MARKWICK, E. E., Observation of variable stars P12:193
MARTIN, E. S., Observatory for amateurs P1: 93
MASCART, M., On aberration A1:128
MASON, E. C., Life in other worlds P6:520
MATZ, F. P., Stone, Ormond P3:452
MAUNDER, E. W., Astronomy P14:153
Progress of astronomy in 1906 ..... P15: 1
Solar origin of terrestrial magnetic disturbances P13:59; P14:228
Spectroscope in eclipse work P6:376
Stars of the 1st and 2d type spectrum A1:145
Sun-spot variation in latitude P12:616
Triad of stars P16:403
MAURY, A. C. De P. P., Corona seen after totality P8:401
MAW, W. H., Work of the B. A. S P8: 65
McBROOM, J. K., Star dust,—a discussion P11:544
McCREARY, R. M., Celestial photography prophesied in 1840 ..... P6:422
Facts and theories P4:575
Illusion and its cause P7: 11
Newspaper astronomy P6:103
McFARLAND, R. W., Almanacs P2:225, 358, 452; P3:114, 303
Ancient eclipses and chronology P7:510; P9:176; P10:172
Astronomical and historical chronology, (W. L. Jordan) P13:112
Calendar S10:129, 247; P16:389
Chronological notes P3:441; P4:63, 194, 233, 353, 391, 529
Gravity on the surface of the planets S2:150
Julian period P14: 98
Lunar cycle P14: 27
Mars and Pyrois P2:238
Miscellany P13:531
New era at hand (Mr. Dimbletz) P3:486
Solar cycle S8:353
McKENNEY, A. P., What women have done for astronomy in the U. S. . P12:171
McLEOD, R. R., Ahaz and sun-dials P7:108
McPIKE, E. F., Bibliography of Dr. Edmond Halley P13:579; P14:425
Halley's comet P12:685; P13:471
Remarks on Dr. Halley P12:453
MEE, A., Webb, Thomas William P13:138
MEES, C. E. K., and S. H. WRATTEN, Filter Yellow K P14:572
METCALF, J. H., An amateur's observatory P14:211
Comet Morehouse P16:655
Telescopic meteors P15:29; P16:588
MEYER, M. W., Formation of rings a process of disintegration .....
..... A2:407; Cor. A2:765
MEYER, W. F., and R. T. CRAWFORD, Jupiter's satellite VIII P16:491
MICHELSON, A. A., Comparison of meter with wave-length of cadmium A2:556

XUM

Volume and Page

MICHELSON, A. A. *(Continued)*
Interference methods applied to spectroscopic measurements....A1:884
Light waves and their application to metrology....A3: 92
and E. W. MORLEY, Earth and luminiferous ether....S6:306
Wave-length of light a standard....S8:241
MILES, J. W., Auroral arches....P16: 65
Meteorite in Lancaster county, Pa....P16:458
MILLER, A. F., Observation of a solar prominence....A1:614
MILLER, E., Astronomy in high schools....P3:161
Corona of the sun seen without an eclipse....P8: 80
New theory of the surface markings of the moon....P3:273
Where did Mars get its moons?....P4:424, 499, 573
MILLER, J. A., Comet Morehouse, (1908 *c*)....P16:653
Perseids of 1899....P7:406
MILLIS, F. E., Leonid meteors, 1898....P7: 47
MINCHIN, G. M., Photo-electric cells....A1:702
MITCHELL, M. E., An astronomer's reverie....P6:564
MITCHELL, S. A., Moon hoax....P8:256
MITCHELL, W. M., Aurora of August 21, 1903....P11:541
Level of sun-spots....P13:392
MONCK, W. H. S., Absorption of light in space....A2:107
Astronomical theory of the ice age....S6:57, 193; S8:193
Average parallax of the stars....S8: 62
Comets De Vico and Finlay....S6:221
Dissipation of comets....S7:239
Distribution of heat on the sun....A3:823
stars....S7:20, 73, 105, 236; S10:409, 453
Double stars....S8:243
Distances of....S7:290
Early conjunction of planets....P8:238
Eclipse cycle....P10:240, 276
of Thales....P10:127
Eclipses, Ancient....P11:131, 242
Ether and gravitation....P1:409
Fixed stars....P1:195, 300, 385; P2:60, 108; P3:62; P4:259; P5:467
Meteor comets....S8:208; S9:216; A1:274
orbits....S10:328
radiants....S9:363, 454; S10:109, 126, 295, 300; A3:344
Meteors and meteorites....S8:395
Celestial phenomena explicable by....S9:260
Meteorites or aerolites....P11:357, 522
Motion of sun and stars in space....P10:307; P16:239
Non-Euclidean geometry....P8:333; P9:370
On an infinite universe....P16:596
Proper motion of the stars....A1:874
and spectra of the stars....A1:389, 700; A2:8, 513

XUM

Volume and Page

MONCK, W. H. S., *(Continued)*
Relative albedo of planets A1:776
Solar heat and gravitation S7:440
Spectroscopic observations on binary stars S9:289
Systematic motions of stars and the galaxy P14:419
Variables of the Algol type P5:559
Venus' rotation period-gravitation P5:168, 273
MORGAN, H. A., Comet *a* 1906, (1905 VI) P14:191
MORGAN, H. R., Effect of temperature upon constants of a transit circle P14:452
MORLEY, E. W., and A. A. MICHELSON, Earth and luminiferous ether S6:306
Wave-length of light a standard S8:241
MOREUX, Th., Great sun-spot, February, 1905 ..... P13:194
MORRIS, L. N., Allen, Richard Hinckley P14:592
MORRISON, J., Roberdeau Buchanan and the doctrine of limits P13:472
Eclipses P4:308, 502; P5:29, 129, 368
Ephemerides, astronomical P2:301
Lunar P3:362, 467
Planetary P4: 32
of satellites P6:165
Saturn's rings P6:389
Sidereal P4: 90
Solar P2:406; P3:25, 86
General perturbations and the perturbative function P8:309; P9:130, 249, 436
Occultations P5:417
Orbit of comet Barnard, 1886 ..... S5:118
Sidereal day P15: 12
Source and maintenance of solar energy P10:409
Star of Bethlehem P11:88, 122
Sun-dial of Ahaz P6:537; P7:368
Transits of Venus and Mercury P5:536
MOSELEY, E. L., Meteor of Sept. 15, 1902 ..... P12:190
MOULTON, F. R., Binaries measured by the use of spectroscope P3:337
Professor Chamberlin on the nebular hypothesis P5:508
Geology, (Chamberlin and Salisbury) P14:327
Graphical method for elements of a parabolic orbit P7:193
Kepler's equation, Important method of solving P3:136
Motions of the planets P11:284
Perturbations of the heavenly bodies P6: 88
Problem of three bodies P5:407
Spheres of activity of the planets P7:281
Teaching general astronomy P4:400
Time P12:391
MOULTON, M. E., Eclipse in India, Jan. 22, 1898 ..... P6:121
MOREAUX, M., Magnetic perturbations of Feb. 13 and 14, 1892 ..... A1:318
MOYE, M. Total solar eclipse of May 28, 1900 ..... P8:368
August 30, 1905 ..... P13:523

XUM

Volume and Page

MULLER, F., Observations of nebulae....S6:361
MULLER, G., Preparations for new variable star catalogue....P11:138
MUSSON, W. B., New telescopes and other optical instruments....P8:378
MYERS, C. E., Equation of the ellipse through five points....S9:268
MYERS, G. W., Astronomical work at Munich....P4:229
Illinois university observatory....P6:319
Observations of Bielids, 1899....P8: 13
Light changes of β *Lyrae*....P6:268
Light fluctuations of variables....P6: 7
NEVILL, E., Ancient eclipses of the sun....P14:616; P15: 32
NEWALL, H. F., Combination of prisms for stellar spectroscope....A3:309
NEWCOMB, S., Aspects of American astronomy....P5:351
Astronomical clocks....S3:206
Eclipse of Agathocles....P13:199
Measures of the velocity of light....S5:15, 68
Philosophy of hyperspace....P6:380
Place of astronomy among the sciences....S7:14, 65
Theories of celestial motions....S2:11, 33
NEWKIRK, B. L., Watson asteroids....P12:645
NEWTON, H. A., Capture of comets by planets....A1: 12
Cometary shooting stars....A3:196
Loomis, Elias....S9:241
Meteorites, meteors, and shooting stars....S6:65, 98, 127
NIPHER, F. E., Positive photography with reference to eclipse work....P9: 24
NITSCH, A. W., Astronomy and civilization....P4:206
NOBLE, W., A night with *Orion*....P4:428
NUMSEN, W. H., Comet 1883 I....S3:81, 110
Nova in *Andromeda*....S5: 51
Variation of....S4:278, 301
NUSL, Fr., and J. FRIC, Communication about the diazenital....P13: 16
NYREN, M., Struve, O. W....P14:352
O'HALLORAN, R., Eclipse of June 28, 1908....P16:516
Light curves of *Mira* and W *Lyra*....P15: 95
Milky Way as it appears in the autumn heavens....P10:372
Philippine firmament....P7:201
R and S *Scorpii*....P4:275, 331
Solar cycle, Details of the recent....P12: 27
Stars that periodically glow and fade....P11:294
Study of solar surface....P16:484
Sun-spot maximum and minimum....P4:570; P6:478; P14:368
OMORI, F., Seismic motion and other phenomena....P14:543
PACKER, D. E., New variables near 5 M *Librae*, cluster....S9:381; S10:107
Solar corona photographed in daylight....P3:361
PANNEKOEK, A., Best method of observing the Milky Way....P5:524
Necessity of further researches on the Milky Way....P5:395
New charts for inserting the Milky Way....P5:485

XUM

Volume and Page

PARKER, D. G., Are other planets inhabited? P10: 357
Dual observatory P14: 96
Saturnian system P12: 405
PARKHURST, H. M., Cause of refraction S10: 16
Diffraction S5: 200
Equatorial telescope S7: 38
How to measure the invisible S9: 406, 442
Instrumental photometry S5: 230
Obliteration from illumination S7: 337
Photometric observations of asteroids S6: 353
Stellar photometry S4: 273; A3: 652
Summation of co-ordinates S5: 53
Temporary stars S6: 118
PARKHURST, J. A., Astronomical photography with reflecting telescopes P14: 449
Comet 1889 V in Jupiter's satellite system A2: 856
Comparison stars for Nova *Geminorum* P11: 328
Mira P3: 165
Parkhurst, Henry M P16: 231
R and S *Scorpii* P4: 331
Variable, A new kind of P3: 214
star 7792 SS *Cygni* P6: 156; P7: 138
North Circumpolar P4: 369, 419
Long period P2: 215, 316, 415
Stars P1: 125, 161, 212, 263, 315, 358, 397, 460; P2: 95
Variable Stars P1: 125, 161, 212, 263, 315, 358, 397, 460; P2: 95
PARR, W. A., Vatican observatory P11: 497
PARTRIDGE, E. A., and H. C. WHITAKER, Galileo's work on Saturn's rings P3: 408
PAUL, H. M., Stars of the *Pleiades* S3: 161
PAYNE, W. W., Alvan Clark and Sons corporation P15: 413
Amherst college observatory telescope P11: 22
An *Aldebaran* occultation P14: 103
Astronomical work in progress S6: 350; S9: 101; A2: 102; P6: 313, 395; P9: 445; P11: 182, 363; P12: 45, 89; P15: 72
Astronomy of the nebulae P9: 490
Attraction and figure of the earth P8: 177; P9: 7, 117
Bruce, C. W. P8: 235
Clark, Alvan S6: 250
Color of the sky P14: 5
Comet Holmes A2: 18
b 1893, (1893 II) A2: 596
b 1902 (Perrine) (1902 III) P10: 477
Comets and comet families P6: 1, 70, 143, 228
Crossley reflector in America P8: 4, 510
Culture value of mathematics and astronomy P12: 585, 633

Volume and Page

PAYNE, W. W., *(Continued)*
Distance and constitution of the sun S7:100
Distances of the stars P1:129
Eclipse of Jan. 1, 1889 ..... S8: 64
May 28, 1900 ..... P8:370
Eclipses, Mathematical theory of P12:515
Explanation of researches on ancient eclipses P14: 86
Extent of the starry heavens P11:411
Free public observatories A3:110
Goodsell observatory's meridian circle S6:302
Greenwich astrographic work P12:651
Growth of worlds P6:346, 401; P7:124
Honor to Dr. Lewis Swift P5: 96
How the telescope aids ordinary vision P3: 81
Illustrations from astronomy P9:151
Is helium terrestrial P3: 16
Jupiter's family of comets A2:800; P1:25, 62; P14:221
satellites, Markings of P14:608
Kirkwood, Daniel P1:167
Latitude variation P12:662
Leonid meteors in 1899 ..... P7:475, 524; P8: 15
in 1901 ..... P9:559
Orbit of P8:523
Lick observatory telescope S9: 97
Local observatory patronage S8:452; S9: 65
Lowell observatory work P8:448
Manual of Astronomy (C. A. Young) P10:394
Mare Crisium P11:130
Mathematics needed for professional astronomy P15:493, 600
Mills expedition from Lick observatory P15:522
Moon P1:16, 289; P2:67; P3:176; P4:143, 242
Photographic atlas of the P11: 25
Motion of the north pole of the earth on its surface P14:513
N. Y. observatory and nautical museum P14:349, 380
Observations for beginners P3:14, 121
Observatory at Jeypore, India P11:542
Pearsons, Dr. D. K., the Christian philanthropist P12:345
Period of *Algol* P10: 25
Personal equation machine S10:139
Photographing the solar corona in 1900 ..... P7:516
sun P2:116
Photography and the figure of the sun P13:475
Planet *Eros* P7:20; P8:445
Mars P3:345, 385; P15:539
and its canals P12:365
Mercury P7:466

XUM

Volume and Page

PAYNE, W. W., *(Continued)*
Pleiades P1:456
Present knowledge of the sun P12:293
Radiant points of meteoric showers P7:337
Recent discoveries of satellites by Americans P13:120
Representative stellar spectra, (Sir Wm. and Lady Huggins) ... P8:323, 365
Revised general astronomy, (C. A. Young) P6:461
Rockwell, Charles H P12:262
Rosse, The Earl of P16:570
Size of the stars P14:164
Solar and terrestrial physical processes P11:374
vortices P16:555
Star of Bethlehem S6:265
names and their meanings, (R. H. Allen) P7:427
Study of astronomy S8:310, 407; P4:57, 116, 495; P8:29, 75, 136, 247
Swasey range finder P12:450
System of the stars, (A. M. Clerke) P14: 71
Systematic study of aurorae A2:602
Telescope care P13:506
for the high school, Small P11:429, 491; P12:546, 608
Trails of stars near the north pole P12:265
Two important books P10:465
U. S. Naval observatory P7:365, 459; P10:14; P11: 57
Report of visitors to P9: 71
Special time signal from P12:613
Variable stars P8:247
Yerkes observatory P5:115, 340; P14:458, 527
telescope P1:176
PENCE, J. B., Visualizing earth's motion P2: 46
PERKINS, C. A., Polarization of undiffracted red radiations A2:847
PERRINE, C. D., Comet *e* 1895, (Perrine) (1895 IV) P3:245, 279
h 1898 (Perrine) (1898 IX) P6:513
Keeler, James E P8:409
Leonid meteors of 1898 ..... P6:553
Motion in nebula surrounding Nova *Persei* P10: 9
Origin of a disturbed region in corona P10:398
Rediscovery of comet Holmes, 1899 *d* P7:340
Tempel$_2$, 1899 *c* P7:291
Search for intra-Mercurial planet at eclipse, 1900 ..... P10:460
Star's position obtained from a photograph P15:259
and W. W. CAMPBELL, Announcing satellite discoveries P14:135, 252
PERRY, S. J., Sun's chromosphere S4: 51
PICKERING, E. C., Address at Liverpool S2:281
Aims of an astronomer P14:583
Algol variable +45°4101 ..... P10:362
Mme. Ceraski's second P8:162

Volume and Page

PICKERING, E. C., *(Continued)*
Algol stars, Early observations of P10: 195
Asteroid orbit of great eccentricity P10: 23
Astronomical photography S2: 50
Bruce photographic telescope S8: 304; P4: 531
Close binary stars S10: 5
Common's 60-inch telescope P12: 660; P13: 70
Comparison stars for variables P6: 125
Constitution of the stars A2: 718
Co-operation in observing variable stars P9: 148
Distribution of energy in stellar spectra A1: 22
Endowment of astronomical research P12: 472
Eros, (Witt's planet DQ 1898) P6: 530; P7: 66
Opposition of P8: 350; P11: 501
Positions in 1893, 1894 and 1896 of P8: 405
Growth of Harvard observatory P8: 89
Intensity of spectral lines P11: 384
Large southern telescope A1: 783
Leonid meteors P7: 412
Magellanic cloud P5: 411
Measurement of photographic intensities P8: 328
Missing asteroids P11: 181
Motion of stars in the line of sight P4: 306
Mountain observatories S2: 105
Nova *Aquilae* P8: 405
Aurigae A1: 228, 417
Centauri P3: 380
Geminorum before its discovery P11: 261
Normae A3: 40
Persei, No. 2 ..... P10: 546
Sagittarii P7: 504
Objective prism A1: 199
Occultation of 26 *Arietis* observed photographically P6: 110
Photographic determination of stellar motions A3: 521
spectrum of the aurora P6: 308
Photographs of faint stars P15: 171
Planetary nebulae S1: 139
Polarizing photometers P6: 60
Proposed Durchmusterung of variable stars P14: 508
Red stars near Nova *Velorum* P16: 63
Reflecting telescope, 24-inch P13: 224
Spectrum of lightning P10: 104
β *Lyrae* A1: 25
a meteor P5: 442
ζ *Puppis* P9: 222
Satellite of Saturn, New P7: 233

XUM

Volume and Page

PICKERING, E. C., *(Continued)*
Spectroscopic binary μ' *Scorpii*....P4:273
Standard stellar magnitudes....P15:303
Star A. G. C. 6886 having large proper motion....P13:503
Stars having peculiar spectra....P4:107; P6:363
Supposed variable Y *Aquilae*....P6:418
Variability in the light of *Eros*, (433)....P9:290, 358
Iris (7) P12:258
Variable star clusters....P3:197; P5:276; P6:505
U *Pegasi* P6: 29
U *Vulpeculae*, and ST *Cygni*....P7:208
stars, New P14:160; P15:617
of short period....P6:262
in *Orion* nebula P12:332
Wedge photometer S1:105
Work for large telescopes....A2:114
PICKERING, W. H., Climate as related to astronomical observations...P3:464
Comet *c* 1905, Rotation of, (1906 I)....P15:100
Drawing ellipses P16:147
Earthquake, February 23, 1892....A1:470
Eclipse of the moon, 1906....P14: 3
sun, 1889 ....S8:337
May, 1900 ....P8:225, 289
Error in the American ephemeris....P9:373
Explanation of the gegenschein....P8: 1
Jupiter and its satellites....A2:193, 390; A3:728, 423; P2:121
Jupiter's outer satellites....A2:481
Leonids....P10:400; P11:6; P12:530
Meteoric shower of Nov 13, 1897....P6:294, 326
Non-appearance of the Leonid shower....P7:395, 523
Period of revolution of the Leonids....P10: 8
Lunar atmosphere P8:205
and occultation by Jupiter....A1:778
changes during eclipse, 1899....P8: 57
crack in the Valley of the Alps....P13: 64
observations by Dr. Klein criticized....P10:118
phenomena in October....P10:419
Observations of the formations of the moon....P10: 57
Mars....A1:668, 849; P13:305
Colors of....A1:449, 545, 632
Double canals of....P12:385
Observations of surface of....S9:369
Photographs of surface of....S9:254
Martian snows P13:196
and lunar canals....P12:77, 439
Melting the polar caps of....A3:308

Volume and Page

PICKERING, W. H., *(Continued)*
Mountain station for Harvard observatory....A1:353
Neptune's position, how computed originally....P14:525
Nova *Persei*, Anderson's....P9:184
Novae *Aurigae* and *Normae*....A3:201
Occultation of Jupiter, 1889....S9:148
Origin of lunar formations....P8:147, 181
Orion nebula....S9: 1
Place of the origin of the moon....P15:274
Polar inversion of the planets and satellites....A2:692
Relation of the moon to the weather....P11:327
Saturn and its satellites....A1:649
Saturn's satellites IX and X....P14: 17
Schiaparelli's latest views on Mars....A3:632
Seas of Mars....A3:553
Spectrum of lightning....P10:104
Standard scale for telescopic observations....P11:113
Telescope mountings and domes....A3: 1
Variable stars in clusters....P6:505
PLASSMAN, J., True form of light curve of *Algol*....A1:419
PLUMMER, W. E., A Hindu astronomer....P7:244
Pritchard, Charles....A2:592
POINCARÉ, H., Milky Way and theory of gases....P14:475
POOR, C. L., Identity of comet Brooks 1889-1896-1903 with Lexell 1770 P13:178
Young, Charles A....P16:218
PORTER, J. G., Constant error in meridian observation....P13:117
Meridian circle at Cincinnati observatory....S8:3; S9: 46
Mitchel, O. M....S8:442
Motion of the solar system....A1:764
Proper motion of stars as criterion of distance....P6:549
Star of Bethlehem....A2: 6
Stars with annual motion of 1″ and over....P8:382
Telescope for Cincinnati observatory, 16-inch....P12:437
Time....S6: 95
POST, C. A., Balance roof for telescope buildings....A2:400
POYNTING, J. H., Astronomical consequences of pressure of light....P15:626
Mean density of the earth....P3:232
PREBLE, E. W., Comet envelopes....S1:280
PRESTON, E. D., Physical constants determined by U. S. C. & G. Survey P6:101
PRITCHETT, C. W., Intersecting rainbows....S7:219
PRITCHETT, H. S., Equatorial like Lick's....S5: 65
Hall, Asaph....P16: 67
Total solar eclipse of April 15-16, 1893....A1:454
Washburn observatory....S1:126
PROCTOR, M., Corona and coronet days, (M. L. Todd)....P7:279
Evenings with the stars....P4:321, 374, 436, 515, 562

XUM

Volume and Page

PROCTOR, M., *(Continued)*
Eclipse expedition in 1905 ..... P12:468
party in Africa P4:445
Expeditions for eclipses, 1905 ..... P13: 90
Making astronomy popular P2:418
Stars and star telescopes (D. P. Todd) P7:335
PUPIN, M. L., Electrical discharges through poor vacua A1:483
Electro-magnetic theory of the sun's corona A2:928
Observing solar corona without an eclipse A2:362
QUIMBY, A. W., Dedication of Flower observatory P5:112
Historic "Gregorian" P5:482
Story of a speculum P5: 26
RAMBAUT, A. A., Approximate solution of Kepler's equation P14:423
RANYARD, C. A., Tails of comets S2: 81
RAVENNE, G., New Planet P6:558
RAYET, G., Temporary star in *Auriga* A1:291
RAYLEIGH, LORD, Theory of stellar scintillation A2:834, 921
READ, E. E., Jr., Solar prominences seen with grating spectroscope S10:369
REED, T., Spectroscope in astronomy P2:266, 297, 402; P3:141
study of variables P3:333
Spectrum of sun in eclipse, 1893 ..... A1:926
and C. A. YOUNG, Nova in *Auriga* A1:289
REES, J. K., Chapel address, Jan. 8, 1902 ..... P10:135
Leonids, 1898-1900 ..... P9: 79
1901 ..... P10:107
Rutherfurd, L. M A1:689
Some facts about the minor planets P6:339
Variation of latitude at New York, and constant of aberration P8:169
RICARD, J. S., Meteorology on the Pacific slope P16: 92
RICCO, A., Sun-spots and magnetic perturbations A2: 33
RICE, H. L., Computing the daily motion of an asteroid P14:287
Method applicable to problems solved by successive approximations P13:370
RIGGE, W. F., Eclipse of Aug. 30, 1905, as visible in the U. S P13:134
June 28, 1908 ..... P16:271
Graphic construction of eclipses and occultations .....
..... P3:183, 247, 310, 353, 414, 454; P4:67, 123, 184
Hagen's astrophotographic journey, Father P15:326
Heiss, Edward P14:332
Jesuit astronomy P12:9, 94, 230, 303, 375
Pope and the comet P16:481, 656
Problems in orthographic projection on a sphere P14:402
Schreiber's Jesuit astronomy P12:9, 94, 230, 303, 375
Solar eclipse of June 3, 1908, visible in U. S P15:610
Time of moonrise P13:550
Transit of Mercury as visible in the U. S P15:488
RIGGS, E., Easy way to make a noon-mark P2: 73

Volume and Page

RITCHIE, J., Jr., Our knowledge of Mars S9:450
ROBERTS, I., Photographic search for planet beyond Neptune A1:554
ROCKWELL, C. H., Annular eclipse S4:147
Transit of Mercury S1: 53
ROE, E. D., Jr., Sun observations at Syracuse university P16:127
Sun-spots in 1907 ..... P15:447
Wind forces on an observatory dome P14:347; P16:424
ROGERS, W. A., Catalogues of stars reduced to a homogeneous system .. S1:205
Clark's new level S1:210
Constant of gravitation P3:316
Graduation of Harvard meridian circle S3:306
Index error of meridian circle S2:138
Ladd observatory dedicatory address S10:491
Methods of tracing constellations S8:145
Star catalogues, Common system of S2:169, 204
ROLLINS, W., Long focus telescopes A3:199
RORER, J. T., Need of revival of interest in astronomy in schools P14:340
ROWLAND, H. A., Gratings for optical purposes S1:116
in theory and practice A2:129
New table of standard wave-lengths ..... A2:320; Cor. A2:563
Normal solar spectrum S5: 85
RUBENS, H., and W. B. SNOW, Refraction of rays of great wave-length, A2:231
RUNGE, C., Dispersion of air A2:426
Law in the spectra of some of the elements A3:128
Line spectra of the elements A1:496
and H. KAYSER, Spectra of the elements A2:802
RUNNING, T. R., Determining five Sundays in February P11:218
RUSSELL, H. C., Chart of circumpolar stars P4: 61
Progress of astronomical photography P2:101, 170, 310, 457
RUSSELL, H. N., Graphical method for elements of a double star orbit .. P6:149
Shadows cast by starlight P10:242
and Z. DANIEL, Venus as a luminous ring P15:516
RUST, F., Computing $\phi - \phi'$ and ρ P15:484
Computing a planet's anomaly and radius vector P16: 36
Integral reduced by hyperbolic functions P15:581
RYAN, T. C., Planet launching P16: 17
Solar apex P15:205, 336
RYDBERG, J. R., Asymmetry in Rowland's concave gratings A2:439
RYDZEWSKI, A., To find day of week on which any date shall fall .....
..... P7:416; Cor. P7:544
SADLER, H., Double stars 30 and 40 *Geminorum* S5:218
Table of stellar parallaxes S9:342
SAFFORD, T. H., Astronomy in the U. S. S7:430; S8:70, 198
Hanging levels attached to a portable transit S9:433
How to make good meridian observations S10:113, 209, 401
New star catalogue S2: 88

XUM

Volume and Page

SAFFORD, T. H., *(Continued)*
Photography and meridian observation S9: 193
Problem of solar motion A2: 1
Proper motion of Bradley's stars S8: 164
SAMPSON, W. T., Changes in Brooks' comet S3: 44
SAUNDER, S. A., Sun-dial of Ahaz P7: 206, 444
SAWYER, E. F., Hints on observing meteors S1: 91, 150
SCHAEBERLE, J. M., Aberration of parabolic mirrors P6: 38
Cometary structure in corona, 1893 ..... A3: 307
Corona on April 16, 1893 ..... A2: 217, 693, 730
Distances of the fixed stars P15: 412
Failure of reflecting telescope of large angular aperture P5: 315
Forty-foot telescope of Lick eclipse expedition P1: 72
Mechanical causes of the sun-spots A3: 278
Nova *Arietis* A1: 751
Planetary photography with a reflecting telescope P3: 280
Region of Lacus Solis on Mars P2: 72; P3: 644
Specter of the Brocken S10: 136
Star's image in field of a parabolic reflecting telescope P6: 33
and A. L. COLTON, Parallax of a meteor determined by photography P5: 232
SCHEINER, J., Surface temperature of sun and stars A3: 569
SCHIAPARELLI, G., Mars A3: 632, 714
Tempel, William S8: 257, 329
SCHLESINGER, F., Apparent figure of the sky P7: 117
Some new astronomical instruments P10: 427
SCHUMANN, V., Hydrogen line in spectra of Nova *Aurigae* and vacuum tubes A2: 159
SEAGRAVE, F. E., Measures of the rings of Saturn P11: 145; P12: 131
Observations of U *Orionis* P12: 145
Nova *Persei* P10: 47, 158
Saturn's equatorial diameter P10: 54
SEARES, F. H., Art of numerical calculation P16: 349
Finding ephemerides for comet 1894 IV, (E. Swift) P15: 433
Obtaining time with the engineer's transit P13: 553
H. C. Wilson's list of *Algol* variables P14: 238
SEARLE, G. M., Astronomical photography of short focus lenses A2: 577
SEE, T. J. J., Age of the earth's consolidation P15: 545
Ages of the stars P6: 361
Aims of stellar astronomy P5: 194
Air waves observed through telescope P5: 479
Apex of the earth's way P1: 373
Apparent enlargement of sun and moon near horizon P8: 362
Astronomical observations at Flower observatory, (C. L. and E. Doolittle) P14: 393
Atmospheric conditions of central and southwestern U. S. P6: 65
Binary of 5½ years' period (β 883) P5: 245

Volume and Page

SEE, T. J. J., *(Continued)*
Cause of the scintillation of the fixed stars P5:463
Doppler's principle applied to motion of binaries A2:812
Double star orbits derived by graphical process A2:581, 865
Eccentricities of the orbits of the binary stars S10: 65
Evolution of the double star systems A2:289
Explanation of the Egyptian Phoenix A1:457
History of the color of *Sirius* A1:269, 372, 550
Jupiter's satellites visible to the naked eye P6:257
Lane, Homer J P14:193
Lawton, George K P9:374
Locus of the center of gravity A3:627
Modern cosmogonies, (A. M. Clerke) P14:313
Orbit of α *Centauri* A3:256
Companion of *Sirius* A3: 82
ζ Sagittarii A2:510
Origin of stellar systems S10:179
Outline of the new theory of earthquakes P16:199
Propagation of the tidal wave P8:373
Recollections of Agnes M. Clerke P15:323
Refractor of Lowell observatory, 24-inch P4:297
Repulsive forces in nature P10:505
Rigidity of the earth P16:602
Roemer, Olaus P11:226, 461
Rotation periods of Venus and Mercury P4:533
Satellites with measurable disks, Dimensions of P9:471
Services of Nathaniel Bowditch to American astronomy P2:385
B. Pierce to American mathematics and astronomy P3: 49
Sirius in ancient times P2:193
Spiral nebulae, Significance of P14:614
Stability of the equilibrium of the oceans P3:178
Study of astronomy and educational ideals P5:429
physical astronomy P2:249, 289, 337
planetary detail P4:550
Temperature for gaseous celestial bodies, Law of P7:129
Why there are no mountains on Mars P16:255
SEELIGER, H., General problems of celestial mechanics P4:407, 475, 545
Nova *Aurigae* A1:904; A3:142
On Newton's law of gravitation P5:474, 544; P6: 40
Quadruple star ζ *Cancri* A3:802
Stars in northern hemisphere S4: 33
SERVISS, G. P., Among the stars with an opera-glass S10:244
New star in *Andromeda* S4:312
Sky from Pike's Peak A3:150
What a 5-inch telescope will show P1:372
SEVERANCE, H. O., List of observatory publications in the U. S P15:517

XUM

Volume and Page

SHEARMAN, T. S. H., Solar disturbances and terrestrial magnetism...S10:279
SHERMAN, O. T., Variation of the solar diameter.....A1:513
SIDGREAVES, W., Bright solar prominence for 1891.....A1: 66
Drawings of solar spots and faculae.....A1:212
Nova *Aurigae* A1:604, 882
Solar chromosphere, 1891 and 1892.....A2:539
disturbances and magnetic storms.....A1:817
Spectroscope for studying solar prominences.....A1:136
Sun's physical constitution.....A2:826
SIMONTON, T. D., Seen and learned abroad.....P12:113, 338
SIRKS, J. L., Astigmatism of Rowland's concave gratings.....A3:763
SKINNER, A. N., Eclipse expedition to Sumatra.....P10: 1
SLIPHER, V. M., Spectrograms of Jupiter.....P11: 1
SMITH, C. M., Stellar photometry.....P5:117
SMITH, C. P., Sun-spot cycles and Scottish meteorology.....S8:385
SMITH, D. E., Mathematical tablets of Nippur.....P15:366
Movements in mathematical teaching.....P13:205
SMITH, H. L., Telescopes of short focal length.....S1:239; S7:293, 360
SMITH, T. B., Come learn of the stars.....S7:213
SNELL, S. C., Packing instruments for transportation.....P8: 88
SNOW, B. W., and H. RUBENS, Refraction rays of great wave-length...A2:231
SNYDER, M. B., A new method of transiting stars.....P10:350
Physical phenomena of the transit of Mercury.....P16:390
SPERRA, W. E., Additional observations of 43. and 45.1907 *Draconis*..P16:569
Discovery of comet *b*, 1893.....A2:757
Graphical computation of the occultations of the star clusters.....P6: 76
Night mirage P16:164
Observations of short period variable stars.....P3:404
Variable stars discovered in 1907, Some Harvard.....P16:488
SPITTA, E. J., Compound wedge photometer.....S9:163
Polarized reflections in Nicols' prism.....S9:266
SPRAGUE, R., Star clusters.....P1:407
STEBBINS, J., Determining heights by migrating birds.....P14: 65
Observations of crater Linné.....P14:510
STEIHEIL, A., Object-glasses for two lenses.....S3:225
STINGLEY, L. L., Fireball of December 7, 1900.....P9:426
STOCKWELL, J. N., Eclipse predicted by Thales.....P9:376
STONE, O., Cincinnati observatory.....S1: 56
Double star observing.....S1: 95
Photographers vs. old fashioned astronomers.....S6: 1
Telescopic illumination S6: 73
STONEY, G. J., Importance of accurately observing the Leonids.....P4:134
Spectroscopic determinations A1:935
and A. M. W. DOWNING, Ephemerides for two situations in Leonid stream P7:403
Perturbations of the Leonids.....P7:227

Volume and Page

STRONG, W., A three-inch telescope P13: 203
STRUTT, R. J., Radium and the sun's heat P12: 75
STRUVE, O., Poulkowa double star work S5: 193
SWEZEY, G. D., Astronomy in our universities and colleges P5: 255
Earth before the earth-moon catastrophe P15: 397
SWIFT, L., "Accident comets" P4: 138
Astronomy in southern California P6: 516
Bailey's beads S9: 170
Comet Barnard 1884 ..... P3: 17
Discovery of nebulae A1: 197
Double Meteors S1: 108; S8: 454
Errors in astronomical text books S8: 160, 254
Intra-Mercurial planet S2: 122, 242
Lowe observatory P3: 465
Medals described P9: 505
Nebulae S4: 1, 36, 174; A1: 566; P10: 160
discovered at Lowe observatory P5: 426, 427; P6: 18, 400
Nebulous ring S9: 47
Right ascension circle, An automatic S8: 349
So-called ice age P10: 88
Star of Bethlehem A2: 105
Star shower, Approaching P7: 415
Suggestions to amateurs P1: 30, 111, 157, 249, 369
Sun-dial of Ahaz P10: 278
Ups and downs of an astronomer P9: 476
Who discovered comet 1862 III? P6: 417, 562
TABER, R. B., Leonid Meteors of Nov. 1901 ..... P10: 403
TACCHINI, P., Distribution in latitude of solar phenomena A1: 134, 424, 711; A2: 262, 425
Solar observations A1: 214, 520, 608, 710; A2: 39; A3: 244, 312, 503, 588
TATLOCK, J., Jr., Meridian circles S3: 275
Star catalogues compared S3: 246
TATNALL, R., Radiation of heated gases A3: 153
and H. CREW, Mapping spectra of metals A3: 741
TAYLOR, A., Eclipse photography A2: 267
TAYLOR, H. D., Triple achromatic object-glass A3: 696
TERBY, Dr., Physical observations of Mars A1: 478, 555
THOMAS, W. E., Law of the atmospheric strata P11: 196
THOME, J. M., National Argentine observatory A3: 8
THOMPSON, G. A., Unusual discoveries of variable stars P13: 445
Variability and asteroids P13: 378
THORP, T., Diffraction grating replicas P14: 93
TISSERAND, F., Satellite of Neptune A3: 291
TODD, D. P., Dimensions of small planets A2: 313
Early history of astronomy at Amherst college P11: 322
Laboratory methods in teaching astronomy P8: 467

XUM

Volume and Page

TODD, D. P., *(Continued)*
Lowell expedition to the Andes....P15:551
Prediction of fine seeing....S5:113
What eclipses of the sun teach us....P9:305
TODD, D. P., and R. H. BAKER, Predictions of the eclipse of Aug 30, 1905....P13:240
TOMKINS, H. G., Bright rays of the moon....P15:296
TONDORF, F. A., Kepler's attitude towards astrology....P12:299
TOWNLEY, S., Atmospheric conditions in the U. S....P6:188
TOWNLEY, S. D., Determination of time from single altitudes....P14:148
Time service at Washburn observatory....A1:467
TOZER, R. S., Tides of the comets....P13:489
TRAYLOR, M. C., Computation of an ephemeris of a planet or comet...P9:311
Opposition of *Eros*....P9:496
TRIER, B., Translations of Gauss and Bessel....P13:231
TROUVELOT, M. E. L., Changes on rings of Saturn....S4: 78
Fall of solar prominence into spot....A1:124
Phenomena observed in Saturn 1877-8....S10:74, 119, 171
TUCKER, R. H., Graduated corrections for fundamental observations...P14:321
errors of a divided circle....P11:523
Ultimate measurement of....P12:579
TURNER, A. B., Simple application of vectors....P16:408
TURNER, H. H., Astrographic chart and methods....P11:433
Common, Dr. A. A....P11:367
Corona of the sun....P14:548
Disturbances of June 17, 1891....A1: 67
Photography applied to astronomical research....P13:72, 122
TUTTLE, H. P., Comet 1846 VI....P6:561
Discovery of the planet Uranus....S8: 34
Limit of vision....S8:302
Lost periodic comet Tuttle-Schulhof, 1858 III....P6: 6
Search for Vulcan in 1860....P7:235
TYDEMAN, E. M., Chinese calendar....P10:335
New form of telescope....P8:464
Paraboloid speculum....P5:559
UPDEGRAFF, M., Calculating transits of Venus and Mercury....S10:225
UPHAM, W., Geological time....P14:264
UPTON, W., Ancient and modern observatories....S10:481
Constellation study....P1:1, 50, 115, 257, 308, 363, 391, 449
Ladd observatory....S10:502
Total eclipse of 1889....S8:118
VAN BIESBROECK, G., Stereoscope applied to astronomical researches P12:318
VEBLEN, A. A., A bright meteor....P16:129
VEEDER, M. A., Aurora of March 30, 1894....A3:401
Concerted observation of aurora....P1: 22
Explanation of above phenomenon....P11:486

XUM

Volume and Page

VEEDER, M. A., *(Continued)*
Magne-crystallic action and the aurora P12: 182
Magnetic storms and auroras of Jan. 7-10, 1886 ..... A2: 449
Solar disturbances and terrestrial magnetism S10: 381
electro-magnetic induction A2: 264
origin of the aurora S8: 403
prominences S9: 279
Sun-spots and auroras, Relation between A1: 434
VENEN, L. P., Folk-lore astronomy P2: 32
VENTOSA, V., Eclipse views at Burgos, Spain P14: 151
VERY, F. W., Distribution of moon's heat S10: 471
VOGEL, H. C., Nova Aurigae A1: 391; A2: 896; A3: 48, 66, 136, 150
Spectrum of iron as a comparison spectrum A1: 151
β Lyrae A3: 358, 561
Velocity of stars determined by spectrographic method A1: 203
VON BRANDIS, A., Transparent cosmic masses overweigh the stars ... P14: 162
VON GOTHARD, E., Small nebula at M 57 ..... A3: 190
Spectrum of nebulae and the new star A2: 51
VON OPPOLZER, E., Brester's views on sun's atmosphere A3: 581
Contributions to solar physics A2: 736
Origin of sun-spots A2: 419
WADSWORTH, F. L. O., Comparison of methods of delineating surface markings of celestial objects P5: 200
Correcting and testing of parabolic mirrors P10: 337
Definition, delineating and resolving power of telescopes P5: 528
Double motion mechanism A3: 527
Electric controls for astronomical instruments A3: 265
Fixed-arm spectroscopes A3: 835
Mounting an equatorial axis on ball bearings A3: 723
New mirror for reflecting telescope P5: 518
WALL, E. J., Use of the spectroscope P14: 336
WALLACE, R. J., Astronomical secondary negatives and their originals P16: 159
Autochrom plate P16: 83
WARNER, W. R., How and why of the Porro prism field-glass P10: 281
Problems in constructing large telescopes A2: 695
WATERBURY, L., and E. ILIFF, Group of time stars for amateurs P2: 74
WATSON, I. I., Variable star U *Cephei* P10: 294
WEINEK, L., Photographic atlas of the moon P5: 240
WELD, L. G., Leonids observed at Iowa university P7: 17
Students' observatory at Iowa university S10: 475
Tables for meridian elongation of *Polaris* S9: 269
WENDELL, O. C., Comet *d* 1907 (Daniel) P15: 622
Comets 1887-8 ..... S9: 38
Euler's equation solved S9: 176
Halley's comet P16: 71
Ephemeris of P16: 459

XUM

Volume and Page

WENDELL, O. C., *(Continued)*
Meteor radiants S4: 153; S5: 152; S6: 359; P16: 517
Orbits of meteors S5: 111; S7: 37
WEST, R. H., Pronunciation of star names from Arabic P2: 209
WETHERBEE, W., Terminator of Venus P12: 67
WHEAT, Q. A., Eclipse aid to chronology P10: 19, 138, 207
WHITAKER, H. C., Observation data corrected by least squares S9: 458
WHITAKER, H. C., and E. A. PARTRIDGE, Galileo's work on Saturn's rings P3: 408
WHITELOW, E. T., Orientation of the field of view of a telescope P15: 22
Spectroscope for small telescopes P12: 363
WHITING, S. F., Drawings and globes in teaching astronomy P13: 235
Graphs in teaching astronomy P13: 185
Jupiter observations P16: 457
Photographs in teaching astronomy P13: 430
Spectroscopic work for classes in astronomy P13: 387
Whitin observatory of Wellesley college P8: 482
WHITNEY, M. W., Comparison stars for variable 4.1903 ..... P11: 428
Determination of the position of comets P4: 177
solar motion P12: 226, 311
Nova *Aurigae* observations A1: 461
Problem of solar motion P5: 309
Recent markings on Jupiter A2: 22
WILCZYUSKI, E. J., Sun's equatorial acceleration and sun-spots P6: 209
WILLARD, C. R., Proctor, Richard A P1: 319
Time and time signals P1: 60
WILLIAMS, A. S., Jovian phenomena P11: 361
Red spot on Jupiter P15: 560
Remarks on Hough's article on Jupiter P11: 188
WILSING, Dr., Sun's rotation determined by faculae A2: 635
WILSON, D. T., A star-correction machine P10: 82
WILSON, H. C., Astronomical work at Goodsell observatory P11: 179
Astronomy with the small camera P1: 26, 49
Astrophotographic chart of the sky A3: 260
Celestial photography at high altitude P12: 509
Comet 1882 I S3: 137
Comet *b* 1882, (1882 II) S3: 1
Comet 1884, II, Barnard's periodic P2: 321
Comet 1889 V S9: 125
Orbits of A2: 793; P1: 151
Comet 1894 *e* (1894 IV) and the lost comet De Vico, 1844 I P2: 241
Comet 1908 *c* Morehouse P16: 563
Comet Halley, Next apparition of P16: 265
Comets 1844 I and 1886 V S6: 121
of 1887 ..... S7: 153
1892 ..... A2: 121

Volume and Page

WILSON, H. C., *(Continued)*
Deviation of a falling body from the vertical P5: 186
Double star Σ 2145 ..... A2: 112
observation errors S5: 174, 211
Exterior nebulosities of the *Pleiades* P7: 57
Great nebula in *Orion* P1: 433
Jupiter observations with 16-inch equatorial A1: 189
Leonid meteor shower P6: 568
Light curve of Nova *Persei* .. P9: 447, 479, 545; P10: 31, 91, 144, 199, 257, 316
Mars observations at Goodsell observatory A1: 684
and his canals S8: 13
Measuring distance of the sun, by *Eros* P12: 149
Meteoric shower of November P6: 502
Nebula in *Andromeda* P7: 507
Nebulous areas of the sky P12: 401
Nova *Geminorum*, 12.1903 ..... P11: 258
Nova *Persei* P9: 197; P10: 74
Number and distribution of the stars, near *Pleiades* P15: 193
Occultation of the *Pleiades*, Dec. 10, 1894 ..... P2: 176
stars in the *Hyades*, Dec. 20, 1904 ..... P12: 611
Our knowledge of comets S5: 257
Photograph of nebula HV 15 = N G C 6960 ..... P10: 432
Pleiades and two asteroids P1: 322
the sun P8: 94
Photographing the Milky Way P3: 58
Physical appearance of comet Holmes A2: 31
Ring nebula in *Lyra* P5: 337
Rotation period of Saturn P11: 443
Spectrum of *Mira*, (*o Ceti*,) P3: 390
Strassburg observatory of the royal university P5: 171
Sun-spot of August 1894 ..... P2: 49
observations, at Goodsell observatory A3: 293
Supposed satellite of Venus S6: 357
Total solar eclipse, January 22, 1898 ..... P5: 251
May 28, 1900 ..... P8: 240, 297
May 17-18, 1901 ..... P9: 267
Tycho Brahe's instruments at Prague observatory P9: 113
Variability of nucleus of *Andromeda* nebula S10: 520
Variable stars of the *Algol* type P8: 113
with different notation P10: 232, 312
short period P14: 75, 255
WILSON, W. E., Absorption of heat in the solar atmosphere A1: 49
Photographic photometer for determining star magnitudes A1: 307
Thermal radiation from sun-spots A3: 378
and P. L. Gray, Effective temperature of the sun A3: 382
WINCHELL, N. H., Very brilliant meteorite P12: 553

XUM

Volume and Page

WINLOCK, W. C., Bibliography of astronomical literature, 1890....S10:83, 356
Comets designated.....S4:5; S5:50; S6:112
WING, D. E., Are other worlds inhabited?.....P11:536
Star dust.....P11:481
WOLF, M., Photographic observation of minor planets.....A2:779
Photographing minor planets.....A2:109
Solar statistics, 1892.....A2:263
Stellar photography.....A2:622
WOLFER, A., Revision of Wolf's sun-spot relative numbers.....P10:449
WOOD, R. W., Invisibility of transparent objects.....P11:202
WOOD, J. B., Case of the Leonids.....P10:459
Geometrical consideration applied to the velocity of comets.....P15:553
Newton's comet.....P1:411
Velocity of comets.....P13:140
WOOD, R. W., Invisiboility of transparent objects.....P11:202
Orbit of bodies under action of a central attraction.....P8: 32
WOODS, W. E., Solar prominence and reversal of the D_3 line.....A3:159
WOODSIDE, C. L., Method of computing occultations.....S5:203
WRATTEN, S. H., and C. E. K. MEES, Filter Yellow.....P14:572
YENDELL, P. S., Flanery, David.....P8:400, 484
Hagen's variable star atlas.....P14:298
Observations of variable stars.....P13:453; P14:537, 596
U *Pegasi*, variable star 8598.....P3:400
Study of variable stars.....
....P2:12; P3:446; P4:13, 536; P5:16, 84, 172, 235, 302, 399; P12: 32
Variable stars of short period.....P2:160, 202, 269, 362
YOUNG, A. S., Leonids.....P4:498
Sun-spot observations, 1900-1.....P10:167
1902-3.....P12:214
1904.....P13:168
1905-6.....P15:127
1907.....P16:188
YOUNG, C. A., Address at Kenwood observatory dedication.....S10:312
Adjustment of the spectroscope.....P5:318
Andromeda, New star in.....S4:281
Astronomical program for 1895.....P2:308
Astronomy in 1876-1886.....S6: 4
Bielid shower.....P7:542
Chromosphere spectrum.....A1:59, 162
Chronological notes.....P4:451
Comet *b* 1882, (1882 II).....S1:187
Constant of gravitation.....P3:382
Flexure of the axis of transit instruments.....S2:101
Lane's law of increase of temperature in gaseous sphere.....P7:225
Mars observed at Halsted observatory.....A1:675
News from nebulae.....S9: 27

XUM

Volume and Page

YOUNG, C. A., *(Continued)*
Pending problems of astronomy S3: 238, 257, 288
Recent papers on Dr. Huggins S8: 289
Red spot on Jupiter S4: 119
Rotation time of S5: 289
Small telescopes vs. large S5: 1
Spectroscope at Halsted observatory A1: 292
Sun's constitution P12: 221
heat P6: 145
Supplemental notes for "The Sun" P5: 277, 332
Telescope for Halsted observatory S1: 131
Transit of Venus observations S1: 299
YOUNG, C. A., and T. REED, Nova *Aurigae* A1: 289
YOWELL, E. I., Is aqueous vapor present on Mars? P7: 237
ZIMMERMAN, W., On making negative enlargements P13: 484, 556

XUM

XUM

Index of Subjects

XUM

INDEX OF SUBJECTS

Volume and Page

Aberration, *M. Mascart*.....A1:128
Constant of.....P10:220, P11:160
of light and solar prominences, *M. Fizeau*.....A1:126
Planetary, *R. Buchanan*.....P13:376
of telescopes, Chromatic, *J. E. Keeler*.....A3:157
and atmospheric refraction, *G. C. Comstock*.....A3:329
M. Loewy.....P4: 87
Abroad, Seen and learned, *T. D. Simonton*.....P12:113, 338
Absorption of heat in the solar atmosphere.....A2:463
light in space, *W. H. S. Monck*.....A2:107
"Accident Comets," *L. Swift*.....P4:138
Address of President of R. A. S., *A. A. Common*.....P5: 1
Advancement of science, Function of criticism in, *F. H. Bigelow*.....P7:252, 292
Aerolite in court.....A1:841
observed.....S4: 94
Aerolites, Origin of.....S9:284
to shooting stars, Relation of, *D. Kirkwood*.....S6:248
Ahaz and sun-dials. (See sun-dials of Ahaz).
Air, Dispersion of the, *C. Runge*.....A2:426
waves observed through telescopes, *T. J. J. See*.....P5:479
Airy's, Sir G. B., Ninetieth birthday, *Observatory*.....S10:392
Alaska boundary survey, *O. J. Klotz*.....P3:348, 395
R. J. Stein.....P3:534
Albedo of planets, Relative, *W. H. S. Monck*.....A1:776
Aldebaran, Occultation of, *G. Davidson*.....S6:195
H. A. Howe.....P13:108
W. W. Payne.....P14:103
L. D. Weld.....P14:250
Aldis' tables of $\frac{1}{2}$ (θ — cos θ).....P10:552
Algol, Companion of, *J. E. Gore*.....P12:359
J. R. Holt.....A3:516
Minima of 1884 of, *C. W. Irish*.....S3: 14
Period of, *W. W. Payne*.....P10: 25
Spectroscopic observations of.....S9:237
stars, Early observations of, *E. C. Pickering*.....P10:195
True form of light curve of, *J. Plassman*.....A1:419
Variable star, *W. Ferrel*.....A2:429
+ 45°4101, *E. C. Pickering*.....P10:362
and β *Capricorni*, *E. F. Sawyer*.....S2:311
Allegheny observatory, *J. A. Brashear*.....P8:541, 565, 566
Allen, Richard Hinckley, *H. S. Davis*.....P14:593
L. N. Morris.....P14:592
Almanacs, *R. W. McFarland*.....P2:225, 358, 452; P3:114, 303

XUM

Volume and Page

Almucantar S3: 285
A new, *A. E. Douglass* P11: 252
tests, *S. C. Chandler* S2: 269
Alt-azimuth mounting, *G. S. Jones* S10: 506
Amateurs, Suggestions to: *L. Swift*
I Nebulae and comet seeking P1: 30
II Great nebula in *Andromeda* P1: 111
III Great nebula in *Orion* P1: 157
IV Other wonderful nebulae P1: 249
V Nebulae and clusters P1: 369
American ephemeris, Error in, *W. H. Pickering* P9: 373
Amherst college observatory, New buildings at P12: 361
Andromeda, Anderson's variable in A3: 317
Nebula in, *J. E. Gore* P16: 325
L. Swift P1: 111
H. C. Wilson P7: 507
Dimensions of P16: 197
Photographs of S8: 141
Theoretical parallax of, *S. J. Corrigan* P16: 256
Variation in, *W. H. Numsen* S4: 278, 301
H. C. Wilson S10: 520
Parallax of λ P12: 431
Andromedae, γ, *S. W. Burnham* S10: 118
Nova, *E. E. Barnard* S4: 240
J. H. Eadie S5: 79
W. H. Numsen S5: 51
H. M. Parkhurst S6: 118
Disappearance of, *L. Swift* S5: 59
Notes on S4: 246-8, 280, 285, 298, 308, 312, 316; S5: 90
Spectroscopic binary λ P15: 120
Spectrum of R S8: 429
Andromedes, (See meteors)
J. M. Boraston A2: 3
Angle-measuring instruments, *F. E. Harpham* P13: 149
Approximations, Methods applicable to problems solved by successive, *H. L. Rice* P13: 370
Aquarii, Nova (and *Delphini*), *M. Fleming* S10: 106
Orbit of Σ 2909, ε, *S. W. Burnham* P4: 474
Aquilae, Nova, *E. C. Pickering* P8: 405
Nova, No. 2, *E. C. Pickering* P13: 471, 513
η P11: 573
Supposed variable Y, *E. C. Pickering* P6: 418
"Triple cave" in, *M. Wolf* P10: 448
Arago on Newton, *W. T. Lynn* P12: 626
Arc, Trisection of the S8: 269
Archimedes, Recently found manuscript of P16: 392

Volume and Page

Arcturus, D. Kirkwood P1:248
The great star P14:183
Argus, Orbit of 9 (β 101), *S. W. Burnham* A2:494; A3:290
Spectrum of γ, *W. W. Campbell* A2:555
L. A. Eddie P3:123
Arietis observed photographically, 26, *E. C. Pickering* P6:110
Nova, *S. Glasenapp* A2:503
J. M. Schaeberle A1:751
Asteroid, Computing daily motion of an, *R. T. Crawford* P14:397
H. L. Rice P14:287
orbit of great eccentricity, *E. C. Pickering* P10: 23
zone, *D. Kirkwood* S1:129
and ring of Saturn, *D. Kirkwood* S3: 6
Asteroids of 1891-1899 ..... A1:627
Companion, *W. H. S. Monck* S7:334
Distribution of, *D. Kirkwood* S6:116
Effects of collisions between, *S. J. Corrigan* A2:207, 304, 474
Elements and notes:
(1) Ceres A3:341; P11:207
(2) Pallas A3:341
(3) Juno P11:207
(4) Vesta A3:341; P11:207
(7) Iris P12:137
(11) Parthenope P8:288
(48) Doris P10:543
(82) Alkmene P9:515
(113) Amalthea P9:515
(135) Hertha S2:314; P12:205
(139) Juewa, *G. C. Comstock* S7:214
(172) Baucis P9:570
(175) Andromache P9:570
(196) Philomena P9:275
(206) Hersilia S4:115
(209) Dido P9:159
(212) Medea P8:516
(228) Agatha S3: 57
(235) Carolina S3: 27
(236) Honoria S4:115
(237) Coelestina S4:115
(238) Hypatia S4:115
(239) Adrastea S4:115
(240) Vanadis S4:115
(241) Germania S4:115; P9:515
(242) Kriemhild S4:115
(243) Ida S4:115
(244) Sita S4:115

XUM

Volume and Page

Asteroids, Elements and notes, *(Continued)*

(247) Eukrate P9:515
(265) Anna P10:154
(279) Thule, *D. Kirkwood* S8: 83
(281) Lucretia, *W. C. Winlock* S8: 42
(295) Theresia P8:516
(306) Unitas P8:559
(314) Rosalia P9:349
(334) Chicago P9:514; P10:154; P11: 47
(347) Pariana P10:154
(359) (1893M) (1902 HS) P10:438
(371) Bohemia (1893 AD) P10:381
(391) Ingeborg (1894 BE) P9:406, 459
(406) Erna (1895 CB) (1903 LP) (1905 QU) P13:567
(416) Vaticana (1896 CS) P10:494
(417) Suevia (1896 CT) (1901 FN) P11:567
(433) Eros (1898 DQ) (See *Eros*).
(434) Hungaria P8:217
(443) Photographica (1899 EF) P10:381
(444) Gyptis, (1899 EL) P8:561; P9:571; P10:267
(446) Aeternitas (1899 ER) P10:267
(449) Hamburga (1899 EU) P10:268
(451) Payientia (1899 EY) P8:102, 160
(453) Tea (1900 FA) (1901 GS) P8:217
(454) Mathesis (1900 FC) P9:514
(455) Bruchsalia (1900 FG) P10: 99
(456) Abnoba (1900 FH) P9:405
(457) Alleghenia (1900 FJ) P8:517
(458) Hercynia (1900 FK) P9:275
(459) Signe, (1900 FM) P8:559
(460) Scania (1900 FN) P8:559
(461) Saskia (1900 FP) P8:559
(462) Eriphyla (1900 FQ) (1907 XL) P8:559
(463) Lola (1900 FS) P9:275
(464) Megaira (1901 FV) P9:514
(465) Alekto (1901 FW) P10: 99
(466) Tisiphone (1901 FX) P9:514; P10: 99
(467) Laura (1901 FY) P9:514; P10:100
(468) Lina P10: 99
(469) Argentina (GB 1901) P10: 99
(470) Kilia (489) (JO 1902) P10:100; P12:137
(471) Papagena (GN 1901) P10: 99; P15:571
(472) Roma (GP 1901) P10: 99
(473) Nolli (GC 1901) P10:268
(474) Prudentia (GD 1901) P10:268
(475) Ocllo (HN 1901) P10:382

Volume and Page

Asteroids, Elements and notes, *(Continued)*

(476) Hedwig P10: 268
(477) Italia (GR 1901) P10: 212
(478) Tergeste (GU 1901) P9: 569; P10: 268; P11: 96
(479) Caprera (HG 1901) P10: 268
(480) Hansa (GL 1901) (QJ 1905) P11: 208
(481) Emita (HP 1902) P11: 48
(482) Petrina (HT 1902) P11: 208
(484) Pittsburghia (HX 1902) P11: 208
(485) Genua (HZ 1902) P11: 208
(486) Cremona (JB 1902) P11: 208
(488) Kreusa (JG 1902) P11: 452
(489) See (470).
(490) Veritas (JP 1902) P11: 452
(492) Gismonda (JR 1902) P11: 452
(498) Tokio (KU 1902) P11: 452
(505) Cava (LL 1902) P11: 568
(554) Peraga (PS 1905) P13: 567
(555) Norma (PT 1905) P13: 567
(556) Phyllis (PW 1905) P13: 567
(557) Violetta (PY 1905) P13: 567
(558) Carmen (QB 1905) P13: 567
(559) Nanon (QD 1905) P13: 567
(560) Delia (QF 1905) P13: 567
(561) Ingwelde (QG 1905) P13: 567
(562) Salome (QH 1905) P13: 567
(563) Suleika (QK 1905) P13: 567
(564) Dudu (QM 1905) P13: 567
(565) Marbachia (QN 1905) P13: 567
(566) Stereoscopia (QO 1905) P13: 567
(567) Eleutheria (QP 1905) P13: 567
(568) Cheruskia (QS 1905) P13: 567
(569) Misa (QT 1905) P13: 567
(581) Tauntonia (SF 1905) P14: 174
H. A. Morgan P14: 174
(588) Achilles (TG 1906) P14: 303
FL 1900 ..... P8: 514
FO 1900 ..... P8: 559
FR 1900 ..... P8: 559
GA 1900 ..... P10: 100
GT 1901 ..... P10: 380
GV 1901 ..... P10: 100, 380
GW 1901 ..... P10: 380
GX 1901 ..... P10: 380
GY 1901 ..... P10: 380
GZ 1901 ..... P10: 380

XUM

Volume and Page

Asteroids, Elements and notes, *(Continued)*
HL 1901 ..... P10:268
Gaps in the zone of, *D. Kirkwood* S10:194
Groups of, *D. Kirkwood* A1:785
Inclination of the, *D. Kirkwood* S8:305
Missing, *E. C. Pickering* P11:181
Photometric observations of, *H. M. Parkhurst* S6:353; A2:570
Polarization of light of, *M. W. Harrington* S3: 79
Recent, *D. Kirkwood* S4:114
Trails of, *E. C. Pickering* P11:153
Watson, *B. L. Newkirk* P12:645
Watson's *22* P12:429
and their relation to the planetary system, *D. Kirkwood* P1: 19
Asteroidal orbits, Inclinations and eccentricities of, *D. Kirkwood* S6:169
Astral geometry, *G. B. Halsted* P9:187
Astrolabe, *M. L. Huggins* A3:793; P2:199, 261
Astronomer, (C. A. Young) *R. Bridges* P13:172
Aims of an, *E. C. Pickering* P14:583
Tools of the, *M. W. Harrington* S2:248, 261, 297
Ups and downs of an, *L. Swift* P9:476
"Astronomer's" globe, *A. E. Douglass* P5: 57
pole, *H. Jacoby* P9:177
reverie, *M. E. Mitchell* P6:564
Astronomers vs. photographers, *O. Stone* S6: 1
of to-day, *H. Macpherson, Jr* P16:397
Wolf-Leavenworth collection of portraits of S9:152
Women, *H. S. Davis* P6:129, 211, 220
Astronomical achievement, (Extracts from address) *D. Gill* P15:467
books for use of students, *H. A. Howe* P9:29, 61, 169, 225
chart, An old, *W. H. Grainger* A1:844
cipher messages S4:161
clock correction A2:284
Pond motor S8:273
clocks, *S. Newcomb* S3:206
Electrical contact apparatus for, *J. E. Keeler* S7: 9
Make-and-break-circuit for, *W. R. Brooks* S7:346
New escapement for A2:761
conference, International, *M. Loewy* P9:393
exhibition of Columbian exposition A1:305; A2:641
facts and fallacies, *J. E. Gore* P16:525
instrument, An ancient, *K. Laves* P8:492
instruments, Standard dimensions in, *J. A. Brashear* S7: 77
investigations, Value of photography for, *G. Clark* P9:294
Journal by Flammarion, *E. S. Holden* S1:103
library S1:296
literature for 1890, *W. C. Winlock* S10: 83, 356

Volume and Page

Astronomical, *(Continued)*
myths,—astrology, *T. Lindsay*.....P6:139, 405
—planets and the weather, *T. Lindsay*.....P7:181
observatory, *G. E. Lumsden*.....P7:307, 371
photography, *Edinburgh Review*.....S7:138, 181
E. C. Pickering.....S2: 50
Progress of, *D. Gill*.....P15:528
H. C. Russell.....P2:101, 170, 310, 457
with commercial lenses, *W. Harkness*.....A1:641
portrait lens, *E. E. Barnard*.....P16:286
reflecting telescopes, *J. A. Parkhurst*.....P14:449
short focus lens, *G. M. Searle*.....A2:577
research, *W. W. Payne*.....P12: 89
Aid to, *E. C. Pickering*.....S9:473; P11:350; P12:472
secondary negatives and their originals, *R. J. Wallace*.....P16:159
society meetings:
(See also Observatory reports and publications)
A. A. A. S.....
S1:122, 162; S9:380; P3:156; P6:185; P7:165, 444; P15: 64
A. & A. S. of A.....P10:110; P11:104; P12:146, 287; P14: 63
Astronomical congress.....A2:78, 640, 743
A. S. of P.....
S8:358; S9:24, 106, 212, 296; S10:132, 254, 429; A1:256, 636; A2:478
A. S. of Toronto, A1:346, 637, 846; A2:95, 287, 383, 479, 575, 861, 939; A3:174, 262, 327, 418, 518; P2:192, 431, 473; P3:160; P4:110, 279, 530; P5:277; P11:55.
Baltimore A. S.....A1:789; A2:575, 669
B. A. A.....S9:456; A1:739; P9:576; P12:285; P13:226; P14:104
Camden A. S.....A1:256; A2:287
Chicago Academy of Science, A1:635, 846; A2:94, 285, 477, 940; A3:87, 173, 262, 326, 419.
Croatian Physical Society.....P12:289
New York Academy of Science.....A2:285, 383, 478, 940; A3:88, 415
R. A. S.....P13:577
R. A. S., of Canada.....P12:630
Wanganui (New Zealand).....P14:122
text books, Errors in, *L. Swift*.....S8:160, 232, 254
theory of the ice age, *R. W. McFarland*.....S6:117
W. H. S. Monck.....S5:293; S6:57, 193; S8:193
molecule and an electronic theory of matter, *S. J. Corrigan*, P15:585; P16:25, 98, 148, 300, 367, 411, 493, 533, 619
work at Munich, *G. W. Myers*.....P4:229
in progress, *W. W. Payne*.....P12: 45
of 1895, *C. A. Young*.....P2:308
1905, *A. C. D. Crommelin*.....P14: 11
with inexpensive apparatus, *G. E. Hale*.....P16:74, 167, 438

XUM

Volume and Page

Astronomy, *E. W. Maunder*.....P14:153
Address on, *A. A. Common*.....P8:417, 496
Amherst college, History of, *D. Todd*.....P11:322
Aspects of American, *S. Newcomb*.....P5:351
Current, *W. W. Payne*.....P6:395; P9:445; P11:182; P15: 72
in education, Place and function, *H. A. Howe*.....P6:371
1876—1886, *C. A. Young*.....S6: 4
in 1889, *W. W. Payne*.....S9:101
1890, *W. W. Payne*.....S10:133
1893, *W. W. Payne*.....A2:102
19th Century, *W. W. Payne*.....S6:350
20th Century, *W. W. Payne*.....P9:286
1906, *E. W. Maunder*.....P15: 1
1907, *Science Year Book*.....P16:174
the High School, *M. E. Byrd*...P11:550; P12:24, 199; P13:545; P15:227
E. Miller.....P3:161
W. W. Payne.....S3: 15
and college, Need of revived interest, *J. T. Rorer* P14:340
Russia, *S. W. Burnham*.....A2:595
southern California, *L. Swift*.....P6:516
U. S., *T. H. Safford*.....S7:430; S8:70, 198
What women have done for, *A. P. McKenney*.....P12:171
universities and colleges, *G. D. Swezey*.....P5:255
of the nebulae, *W. W. Payne*.....P9:490
Field for woman's work in, *Mrs. M. Fleming*.....A2:683
Folk-lore, *L. P. Venen*.....P2: 32
Foreign notices of American.....S2:72
Good books on.....P13:580
History of, *G. F. Chambers*.....S10:457
H. S. Davis.....P6:455
Illustrations from, *W. W. Payne*.....P9:151
Instruments and work of, *A. Hall*.....S4: 97
Laboratory course in elementary, *M. E. Byrd*.....P14:294
for general, *M. E. Byrd*.....P10:131
Neglected field of fundamental, *J. R. Eastman*.....A2:126, 315
Nippur excavations.....P11:111
Pending problems of, *C. A. Young*.....S3:238, 257, 289
Place of, *S. Newcomb*.....S7:14, 65
Plea for elementary, *M. E. Byrd*.....P15: 25
Popular study of, *M. E. Byrd*.....S6:151
M. Proctor.....P2:418
Popularized.....A2:376
of precision, Problems in, *G. C. Comstock*.....P4:457
Problems in sidereal, *J. Ennis*.....S2: 67
Recent, *W. W. Payne*.....P6:313; P11:363

Volume and Page

Astronomy, *(Continued)*
Schreiber's Jesuit, *W. F. Rigge*.....P12:9, 94, 230, 303, 375
Scottish, *H. Macpherson, Jr*.....P14:206
of Shakespeare, *O. E. Harmon*.....P6:232, 263, 321
Sketch of theoretical, *A. Hall*.....P5: 9
with small camera, *H. C. Wilson*.....P1:26, 49
Spectroscopic work for classes in, *S. F. Whiting*.....P13:387
Study of, *W. W. Payne*...S8:310, 407; P3:377; P4:57, 116; P8:29, 75, 136, 247.
with photographs, *W. W. Payne*.....P4:495
physical, *T. J. J. See*.....P2:249, 289, 337, 384
Teaching descriptive, *H. A. Howe*.....P4:225, 363
with arc method descriptive, *K. Laves*.....P14:217
general, *F. R. Moulton*.....P4:400
with drawings and globes, *S. F. Whiting*.....P13:235
graphs, *S. F. Whiting*.....P13:185
laboratory method, *M. E. Byrd*.....P7:472
D. Todd.....P8:467
photographs, *S. F. Whiting*.....P13:430
and civilization, *A. W. Nitsch*.....P4:206
educational ideals, *T. J. J. See*.....P5:429
geology, Untrodden ground in.....A3:325
Astrophysical Journal, *G. E. Hale*.....A1:17; A3:831
Index.....P16:453
"Autochrom" plate, *R. J. Wallace*.....P16: 83
Atmosphere, *F. J. B. Cordeiro*.....P13:384
Effect of mountains on, *A. E. Douglass*.....P7:354
telescope and observer, *A. E. Douglass*.....P5: 64
Atmospheric absorption, *S. P. Langley*.....S3:267
condition, *J. R. Hooper*.....S3:230
conditions of central and southwestern U. S., *T. J. J. See*.....P6: 65
S. Townley.....P6:188
strata, Law of, *W. E. Thomas*.....P11:196
Auhagen's demonstration, *W. Auhagen*.....P15:445
Aurigae, Radial velocity of β.....P12:215
Nova.....A1:233, 249, 328, 330, 434, 828; A2:270
E. E. Barnard.....P2:307
W. W. Campbell.....A1:715,820; A2:149
A. M. Clerke.....A1:504
R. Copeland.....A1:593
A. L. Cortie.....A2:521
Mr. and *Mrs. W. Huggins*.....A1:571
E. C. Pickering.....A1:228, 417, 750
G. Rayet.....A1:291
T. Reed and *C. A. Young*.....A1:289
H. Seeliger.....A1:904, 929; A3:142

XUM

Volume and Page

Aurigae, Nova, *(Continued)*
W. Sidgreaves.....A1:604, 882
H. C. Vogel.....A2:896; A3:48, 66, 136, 150
M. W. Whitney.....A1:461
C. A. Young and *T. Reed*.....A1:289
disappearing, *H. C. Wilson*.....A1:346
Measures in spectrum of.....A3: 66
Motion of, *W. W. Campbell*.....A1:881
H. C. Vogel.....A1:391
a nebula, *E. E. Barnard*.....A1:751
J. M. Schaeberle.....A1:523
New outburst.....A1:737, 934
and *Normae*.....A3:201
Observations of.....A2:174
W. W. Campbell.....A1:715; A2:417
Spectrum of, *W. W. Campbell*.....A2:722
H. Crew.....A1:231
Mr. and Mrs. Huggins.....A2:609
W. Huggins.....A2:349
V. Schumann.....A2:159
W. Sidgreaves.....A1:882; Cor. A2:560
Visual appearance of, *W. Huggins*.....A3:314
Aurora, *H. G. Blatchley*, Aug. 21, 1903.....P11:578
J. M. Boraston, April 25, 1892.....A1:521
C. S. Bryant.....S1: 88
J. B. Coit, Aug. 21, 1903.....P11:534
A. R. J. F. Hassard.....P16:517
M. E. Hutton, Aug. 6, 1896.....P4:276
W. M. Mitchell, Aug. 21, 1903.....P11:541
F. E. Seagrave.....A1:539
M. A. Veeder, March 30, 1894.....A3:401, 779
Concerted observation of, *M. A. Veeder*.....P1: 22
Solar origin of, *M. A. Veeder*.....S8:403
and zodiacal light, *A. Harvey*.....P10:332
Aurorae, Height of, *J. A. Copeland*.....A3:506
Notes on.....A1:173, 237, 249
sun-spots, and earth currents, *M. A. Veeder*.....P1:479
Systematic study of, *W. W. Payne*.....A2:602
Auroras, (See magnetic storms)
of January, 1892, *M. A. Veeder*.....A1:239
Observations in north Greenland of, *M. A. Veeder*.....A3:779
sun-spots.....S1: 98
and magnetic disturbances.....A1:617
Aurora borealis, *A. R. J. F. Hassard*.....P15:256
A. B. Hervey.....P15:446
A. G. Zambrano.....P15:576

Volume and Page

Aurora *(Continued)*
charging an electro-magnetic clock P12:288
Aurora-inclinometer, *F. H. Bigelow* S10:496
Auroral arch, Aug. 21, 1903 ..... P12:218
O. A. Allen P12: 65
D. L. Stewart P12: 65
arches, *F. Campbell* P11:575; P15:448
A. R. J. F. Hassard P16:455
J. W. Miles P16: 65
A. W. Williamsen P11:578
phenomena, *D. E. Hadden* P10:249
or zodiacal light, *D. E. Hadden* P10:388
Awards of medals, prizes, etc.:
Arago medal A3:81; P1:336; P2:33
Astronomical Journal prize A2:283, 848; P2:474
society of Mexico, medals P15: 59
Boyden premium P7:80; P13:172; P15:515
Bredekhine prize P10:334
Carnegie institution fund P11:103
Funds for scientific research:
Anonymous P10:223
Carnegie institution P11:103
Gould P7:168; P9:276; P11:275
Hodgkins A2:560
Research endowment P12:472
Gwilt gift P5: 96
Janssen medal P2:331; P13:412; P14:446
Lalande prize S1:42, 46, 100; S2:131; A2:186; P12:361
Lawrence fellowship P13:350, 415
R. A. S. medals A3:169; P1:286; P13:172; P14:124, 254
R. P. S. awards P14:137
Rumford medal S2:160
St. Louis exposition medal P12:679
Warner astronomical prize .....
S1:21, 125; S3:58, 94, 124; S4:61; S5:123, 188; S6:225; S7:222; S8:372
Babylonian astronomy, Researches in A1:347
table of squares S2:317
Bailey's beads, *L. Swift* S9:170
Barnard, E. E., *S. W. Burnham* P1:193, 341, 441
Barometric pressure, Mean values of, *Solar physics committee* P16:549
Bessel's Log. B for great elevations, *H. P. Tuttle* S7:406
Biela meteors, (See meteors)
Binary pairs, Hypothetical parallax of, *E. S. Holden* S7:356
star, Orbit of companion of a, *J. H. Boyd* P3: 19
Binary stars (See double stars and spectroscopic binaries)
β 151, Orbit of β *Delphini, R. G. Aitken* P10:486; P11: 28

XUM

Volume and Page

Binary, β 151, Orbit of β *Delphini, (Continued)*
S. W. Burnham.....S10:215
β 208, *S. W. Burnham*.....A1:464
in periastron, *T. J. J. See*.....P16:126
β 216, Orbit of.....P11:576
β 395 = (82 *Ceti*), Orbit of new.....PP5:329; P6: 59
R. G. Aitken.....P13:190
S. W. Burnham.....S5: 87
β 416 = (*Scorpii* 185), *S. W. Burnham*.....S10:489; A2:792
S. Glasenapp.....A2:402
β 612, Motion of, *S. W. Burnham*.....S10:323; A1:268
S. Glasenapp.....P15:648
β 733 = (85 *Pegasi*), Elements of.....A2:187; P14:506
Orbit of, *L'Astronomie*.....S3:213
β 883, 5½ year period of.....P5:245
New measures of, *T. J. J. See*.....P5:173
Σ 1687, Coma *Berenices* and O Σ 4, *S. W. Burnham*.....P5:125
Σ 1785, Period of, *S. W. Burnham*.....A2:397
Σ 1998 (ε *Scorpii*), Orbit of, *S. W. Burnham*.....P13:472
Σ 2107, Orbit of, *S. W. Burnham*.....P5:449
O Σ 82, *S. Glasenapp*.....A2:759
O Σ 215, Orbit of, *S. W. Burnham*.....P4:543
O Σ 224, *S. W. Burnham*.....A1:661
S. Gasenapp.....A2:702
Orbit of, *J. E. Gore*.....A3:559
O Σ 285, Orbit of, *S. W. Burnham*.....S10:273; A2:586
O Σ 535, Period of δ *Equulei*, *S. W. Burnham*.....S2:244
Δ 15, Orbit of, *H. B. Evans*.....P7:306
Close, *E. C. Pickering*.....S10: 5
Density and figure of close.....P9:461
Determining apparent orbits of, *C. P. Howard*.....A3:425
discovered by T. J. J. See.....P4:451
Eccentricities of the orbits of, *T. J. J. See*.....S10: 65
Masses of, *S. M. Hadley*.....P11:240; P13:260, 323
measured by the use of the spectroscope, *F. R. Moulton*.....P3:337
Spectroscopic observations of, *W. H. S. Monck*.....S9:289
systems, *S. W. Burnham*.....P4:169
Binaries, Three interesting, *N. M. Mann*.....S9:385
Binocular Porro prism.....P11:279
telescope, Performance of a, *D. W. Edgecomb*.....P10:523
Bode's law applied to satellites, *W. T. Lynn*.....A2:895
Bologne, Italy, observatory, New.....P15:257
Bolometer, History of the.....A2:78, 465
work, Mr. Langley's progress in.....A3: 41
Books, Two important, *W. W. Payne*.....P10:465
Bowditch's, Nathaniel, services to American astronomy, *T. J. J. See*.....P2:386

Volume and Page

Bradley's stars, Proper motion of, *T. H. Safford*.....S8:164
Brahe, Tycho.....S4: 86
C. E. Furness.....P3:221
Brahe's death, Tercentenary of Tycho, *Nature*.....P9:565
Instruments at Prague observatory, *H. C. Wilson*.....P9:113
star, Place of Tycho, *S. W. Burnham*.....S9:449
Bright wire illumination for micrometers, *S. W. Burnham*.....S1:110
British astronomical society work, *W. H. Maw*.....P8: 65
Brooks' cometary mass, *W. R. Brooks*.....S2:149
Buchanan, Roberdeau, and the doctrine of limits, *J. Morrison*.....P13:472
Burnham on double stars, *G. C. Comstock*.....S10:277
Calculating machines, Some, *H. S. Davis*.....P4: 20
Calculus by means of finite differences, Differential, *R. Buchanan*...P13:245, 309
Calendar, *R. W. McFarland*.....P16:389
Chinese, *W. L. Hornsby*.....P10:229
E. M. Tydeman.....P10:335
Perpetual, *R. W. McFarland*.....S10:129, 247
Calendars, Ancient, *K. Laves*.....P14:276
California university proposed astronomical observatory.....P6:479
Camelopardalis, Nova, *M. Fleming*.....S10:152
Canals, Explanation of Martian and lunar, *W. H. Pickering*.....P12:439
and separative powers of glasses, Double, *P. Lowell*.....P12:575
ζ *Cancri*, Quadruple stars, *H. Seeliger*.....A3:802
θ *Cancri*, Proper motion of.....P11:577
ξ *Cancri*, System of, *S. W. Burnham*.....A2:872
A. M. Clerke.....S9:300
Capella, a visual double star, *H. C. Wilson*.....P9:109
β *Capricorni*, Occultation of.....S3:91, 150
Cartesian co-ordinates, Equation of, *H. H. Furness, Jr*.....S9:200
β *Cassiopeiae*, Companion to, *S. W. Burnham*.....P8:540
η *Cassiopeiae*, Orbit of.....P9:578
Castor, Orbit of, *S. W. Burnham*.....P4:286; P12:627
Quadruple star, *W. W. Campbell*.....P13: 87
Catalogue of 130 polar stars.....S6:157
1278 stars, *G. Davidson*.....S3:250
Catalogues of stars to a homogeneous system, *W. A. Rogers*.....S1:205
Celestial motions, Theories of, *S. Newcomb*.....S2:11, 33
photographs, Comparison of.....A1:634
photography.....P14:575
α *Centauri*, Orbit of, *T. J. J. See*.....A3:256
ω *Centauri*, *S. I. Bailey*.....A2:689
Centauri Nova, *E. C. Pickering*.....P3:380
Century, Twentieth, *J. Edmunds*.....P8:140
U *Cephei*, *I. I. Watson*.....P10:294
Light curve of.....P10:159
Observations of, *G. L. Jones*.....P9:408

XUM

Volume and Page

Cepheus, Stars of the 5th type in A1:235
Ceres, Pallas and *Vesta,* Diameters of, *E. E. Barnard,*
(See Asteroids,) (1), (2), (4) A3:341
Chapel address, Jan. 8, 1902, *J. K. Rees* P10:135
Chromosphere in 1891 and 1892, Solar, *W. Sidgreaves* A2:539
line in Angström 6676.9, *A. L. Cortie* A1:135
C. A. Young A1:162
Chronograph, An improvised, *S. H. Brackett* A1:252
A printing, *G. W. Hough* S5:161
Chronological notes, *R. W. McFarland* P3:441; P4:63, 194, 233, 353, 391, 529
C. A. Young P4:451
Cincinnati observatory's new 16-inch, *J. G. Porter* P12:437
Circle on the celestial sphere, A great, *O. E. Harmon* P4:555
Graduation of Harvard meridian, *W. A. Rogers* S3:306
Circles, Notes on meridian, *J. Tatlock, Jr* S3:275
Right ascension, *H. M. Parkhurst* S4: 23
at Strassburg, Meridian, *E. S. Holden* S3:199
Circumpolar stars, A chart, *H. C. Russell* P4: 61
Clark, Autobiography of Alvan S8:109
Clark & Sons, Corporation, The Alvan, *W. W. Payne* P15:413
Climate as related to astronomical observations, *W. H. Pickering* P3:464
Clock connections for operating chronograph, Electrical A3:184
corrections, Computations of, *F. H. Bigelow* S7: 97
for Lick observatory, *E. S. Holden* S1:135
rate and barometric pressure, Relation between P7:501
stopped by lightning P12:570
Clocks, Break-circuit for, *C. H. Chandler* S9:233
W. P. Gerrish S9:124
Non-interfering break-circuit for, *F. G. Blinn* S10:475
Cloud heights and velocities, *Nature* P4:141
Clusters and nebulae, Catalogue of P16:264
Code for aurora observations A3:170
Gerrish system, *E. C. Pickering* P14:252
Coffin's tables, Errors in, *W. C. Winlock* S2:219
Color curve of a lens, Obtaining, *H. Crew* A1:933
perception, *F. J. B. Cordeiro* P16:609
phenomena at sunset, *G. C. Comstock* A2:769
J. E. Keeler P7: 98
L. Swift P6:589
Come learn of the stars, *T. B. Smith* S7:213
Comet:
Biela A2:278
Brooks Periodic, (See 1889 V, 1896 VI)
S8:321, 363, 371, 417; S9:39, 125, 134; P1:89; P2:424; P4:50, 105, 160, 219, 270, 272, 387; P11:44, 266, 348, 395, 451, 506, 567.
Companions to, *E. E. Barnard* S8:360

XUM

Volume and Page

Comet *(Continued)*
Brooks, *W. R. Brooks*.....S8:363
and Comet Holmes, Spectra of, *W. W. Campbell*.....A2: 57
Lexell, Identity of, *C. L. Poor*.....P13:178
in Jupiter's satellite system, *J. A. Parkhurst*.....A2:856
Orbits of, *H. C. Wilson*.....A2:793; P1:151
Return of 1903-4.....P11:348, 395, 451, 506, 567
Brorsen, Short period of, *G. A. Hill*.....A1: 7
S3:218, 283; S8:464; S9:37-8; A1:251, 343; A3:787; P8:558.
D'Arrest.....S2:145; S9:38, 227, 420, 465; P4:572; P5:50, 108, 166, 275; P11:450.
Donati.....A2:572; P16:646
Encke, Periodic, S5:19; S7:353; S10:367, 420; A3:869; P2:189, 234-5, 279-80, 333; P6:250, 304; P9:405, 513; P12:136, 489, 562, 673; P13:53.
(See 1888 II)
Finlay through Praesepe cluster (See 1886 VII).....A2:759
Halley.....A3:325
J. C. Dean.....P16:331
Detroit News.....P16:522
F. W. Henkel.....P15:238
E. F. McPike.....P12:685
Research committee on.....P16:574
Ephemerides of, *O. C. Wendell*.....P16:71, 459, 509
Perturbations of.....P15:317
Holmes, (See 1892 III, 1899 II.)
A1:929, 940; A2:83-4, 176, 180-4, 277, 369-70, 854, 934; A3:324; P3:39; P7:273, 327, 387, 498-9, 541; P8:101; P14:114, 495.
Disintegration of, *W. W. Payne*.....A2: 18
New outburst of.....A2:179
E. O. Lovett.....A2:277
Physical appearance of, *H. C. Wilson*.....A2: 31
Probable origin of, *S. J. Corrigan*.....A2:24, 99
E. Holmes.....A2:370
Spectrum of, *J. E. Keeler*.....A2:272
Transformation of, *E. E. Barnard*.....A2:180
Lexell, *E. E. Barnard*.....S9:116
and Comet Brooks, Identity of, *C. L. Poor*.....P13:178
Newton, *J. B. Wood*.....P1:411
Schmidt, 1882, Elements of.....S1:259
Swift observed and photographed, *E. E. Barnard*.....A1:386
Tempel$_1$-Swift (1867 II) S10:147, 287, 367, 419, 468, 476; A1:85, 250, 343, 626; P6:252, 306; P13:271-3.
Tempel$_2$-Swift (1873 II) S8:133; A3:411, 514, 598, 706; P1:422, 472; P7:271, 291, 327, 386, 439; P8:102, P12:487, 671; P13:53, 97.
C. D. Perrine.....P7:291

XUM

Volume and Page

Comet, *(Continued)*
Tempel$_3$-Swift.....P4:572; P10:438; P11:46; P16:508, 575, 644
Winnecke, (See 1886 VI, Comet 1892, 1898 II.)
S5:288; S10:516; A1:86, 170, 342, 444, 536, 626, 747, 837; A2:184; P4:220; P5:440, 557; P6:57, 251; P11:566; P12:137.
Wolf, (See 1884, III, 1891, 1898 IV.)
S3:254, 283, 286, 318; S4:27; S5:18; S9:184; S10:201, 241, 287, 366, 420, 469, 476, 516; A1:86, 169, 170; P6:250, 305, 358, 415, 476, 534, 584; P7:45, 165; P12:360.
Zona (1890 IV) and Spitaler (1890 VII), Strange coincidence, *E. E. Barnard*.....S10: 18
69 B. C.....P16:646
1812 I and 1846 IV, *D. Kirkwood*.....S5: 13
1825 I.....P16:452
1827 I.....P11: 46
1844 I and 1886 V, *H. C. Wilson*.....S6:121
1845 II.....P10:153
1846 VI, *H. P. Tuttle*.....P6:561
1851 III (See Comet Brorsen.)
1858 I Tuttle.....S1:310; S5: 59
III Tuttle, *L. Swift*, S3:154, 181; *H. P. Tuttle*.....P6: 6
1862 II, *G. W. Hough*.....P6:585
III, *H. P. Tuttle*.....P6:535
Discovered by whom, *W. F. Denning*.....P7:15, Cor. P7:105
L. Swift.....P6:417, 562; P7:104
1863 I.....P11: 44
1866 and November meteors, *D. Kirkwood*.....S4:225
1874 II.....S1:309
1879 V.....P3:328
1881 (*b*).....S2:305
II Tebbutt.....P11: 44
V Denning.....S9:38, 87; P11:395
VI Barnard.....S6:320
1882 I (*a* 1882) Wells.....S1:60, 127; S2:128, 163
Notes, *H. C. Wilson*.....S3:137
Photometric observations of.....S1:272
Spectrum of, *Lohse and Copeland*.....S1:134
W. M. Huggins.....S1:114
II Gould (Great Cruls, *b* 1882) Notes, S1:165, 167, 171, 187-90, 195-6, 200, 221, 224, 227-30, 233, 236, 254-5, 278; S2:27, 29, 128, 162; S7:309; S8:229; S9:226.
C. S. Hastings.....S1:171
H. A. Howe.....S3: 97
Nucleus of, *H. C. Wilson*.....S3: 1
Tail of, *E. E. Barnard*.....S3:168
III (*c* 1882) Barnard, Observations of.....S1:168, 236

Volume and Page

Comet, *(Continued)*
1883 I Brooks S2:56, 63, 95; S3:55; S5:92; P14:430
W. H. Numsen S3:81, 110; S5: 92
Changes in, *W. T. Sampson* S3: 44
transits over star S3:118
IV = Pons 1812 (Brooks) S2:220, 257, 285, 288, 318-9; S3: 26-9, 44, 54, 59, 62, 81, 90, 118, 137; S4:152.
1884 I Ross S3:55, 124; P6:357
II (*b* 1884) Barnard S3:188, 190, 252, 284, 313, 316-7; S4:29; S5:21; S9:37, 87; P2:189, 382; P3:38; P8:461.
H. C. Wilson P2:321
Probable observation of, *L. Swift* P3: 17
III (*c* 1884) Wolf (See Comet Wolf.)
1885 II (*a* 1885) Barnard S4:179, 184, 186, 217, 219, 222, 252-3; S 5:19, 93, 127, 153, 157; S9:184.
1886 I (*d* 1885) Fabry S5:62, 122, 142, 153, 157-8, 189, 256
II (*c* 1885) Barnard S5:21, 57, 118, 122, 142, 256
III (*b* 1886) Brooks S4:252; S5:19, 185, 187, 220, 317; P3:482; P16:452.
IV (*c* 1886) Brooks S5:217-8; S10:517; A1:85, 169, 251, 343, 537
V (*a* 1886) Brooks S5:89, 91, 185-6, 190
VI (*d* 1886) (See Comet Winnecke.)
VII (*e* 1886) Finlay S5:309; S6:42, 221; S9:135; A2:372, 469, 569, 663, 759.
VIII (*c* 1887) Barnard S6:114
IX (*f* 1886) Barnard S5:275, 310; S7:118
1887 I (*a* 1887) Thome S6:113, 226; S7:248
II (*b* 1887) Brooks S6:113; P12:487
III (*d* 1887) Barnard S6:161, 221, 320
IV (*e* 1887) Barnard S6:220; S7:125, 405
V (*f* 1887) Olbers-Brooks S3:283; S6:289, 294, 327; S7: 89
1888 I (*a* 1888) Sawerthal S7:118, 168, 170, 215, 216, 221, 257, 262, 268, 308, 352.
II (*b* 1888) Encke (See Comet Encke) S7:353; S10:367, 420
III (*c* 1888) Brooks S7:353, 364-5, 404; S9: 87
IV (*d* 1888) Faye S7:354; S8:34; P3:152, 209, 327; P11:266, 348, 451, 566.
V (*f* 1888) Barnard S7:459; S8:34, 84
1889 *a* Brooks (Seen but once) S8: 84
I (*c* 1888) Barnard S7:354, 357, 405, 446, 451, 456; S8:34, 39, 132, 225, 319, 370; S9:135, 185, 227, 275-7.
II (*b* 1889) Barnard S8:227, 266, 319, 370, 418, 466; S9:88, 420
III (*c* 1889) Barnard S8:320, 371
IV (*e* 1889) Davidson S8:322, 372; S9:228; P12:487
V (*d* 1889) (See Comet Brooks)
VI (*f* 1889) Swift S8:463, 465; S9:26, 40, 88

XUM

Volume and Page

Comet, *(Continued)*

1890 I (*g* 1889) Borrelly.....S9:40, 88-9, 275
II (*a* 1890) Brooks....S9:229, 276, 323-4, 373, 420, 465; S10:147, 201
III (*b* 1890) Coggia.....S9:37, 185; A2:371
IV (*e* 1890) Zona.....S9:466; S10:18, 35, 101-2; P4:105
VI (*c* 1890) Denning.....S9:374, 419
VII (*f* 1890) Spitaler.....S9:466; S10:18, 35, 101
1891 I (*a* 1891) Barnard-Denning.....S10:241, 288, 368; P10: 99
IV (*e* 1891) Barnard.....S10:469; A1:87, 251
1892 I (*a* 1892) Swift A1:342, 344, 443-4, 523, 536, 625, 698, 747, 836, 942; A2:184.
A. E. Douglass.....A2:202
Photography of.....A2:645
II (*c* 1892) Denning.....A1:343, 445; A2:184; P6: 56
III (*f* 1892) (See Comet Holmes.)
IV (*b* 1892) Spitaler (See Comet Winnecke.)
V (*e* 1892) Barnard.....A1:835, 941; P7:387; P8:215; P14:113
Photographic discovery of, *E. E. Barnard*.....P3: 13
VI (*d* 1892) Brooks...A1:343, 697, 746, 833-6, 941; A2:85-6, 569, 663
1893 I (*g* 1892) Brooks.....A1:697, 941; A2:85, 185, 279, 369, 470, 569
(*c* 1893) Brooks.....A2:854, 936; A3:80, 255; P1:143, 186-7
E. E. Barnard.....P1:145
Photographs of, *E. E. Barnard*.....A3:789
Spectrum of, *W. W. Campbell*.....A3:571
II (*b* 1893) Rordame-Quenisset A2:596, 658, 660, 751, 757-8, 854, 934; A3:170.
W. W. Campbell.....A2:652
G. E. Hale.....A2:653
J. E. Keeler.....A2:650, 751
W. W. Payne.....A2:596
Photographs of.....A2:660; P1:44, 143
Photography of, *W. J. Hussey*.....P2:353, 445
Spectrum of, *W. W. Campbell*.....A2:652; A3:571
1894 I (*a* 1894) Denning.....
.....A3:323, 410,514-5; P1:421, 469; P9:348; P12:58; P16:575
II (*b* 1894) Gale... A3:411, 504, 512-4; P1:422, 470-2; P2:44; P9:348
in a 1½-inch glass, *F. E. Harpham*.....P1:472
Photographs of, *E. E. Barnard*...A3:421, Cor. A3:706
IV (*e* 1894).....P2:189, 234, 279; P3:871; P8:47, 396,557; P15:433
Ephemeris, *F. H. Seares*.....P14:113
and lost comet De Vico, 1884 I, *H. C. Wilson*.....P2:241
1895 II (*a* 1895) Swift.....P3:95, 151, 264-5; P7:44; P10:266, 380, 493
III (*d* 1895) Brooks.....P3:209, 211, 266, 270, 327
IV (*c* 1895) Perrine.....P3:209, 245, 265, 279, 327, 434-6, 533; P4:161
C. D. Perrine.....P3:245, 279
1896 III (*b* 1896) Swift.....P4:50, 105; P7:221

Volume and Page

Comet, *(Continued)*
1896 IV (*e* 1896) Sperra (See Comet Brooks.)
V (*d* 1896) Giacobini.....P4:218-9, 271, 333, 386; P11:206, 395, 452
VII (*a* 1896) (*g* 1896) Perrine-Lamp.....
.....P3:434; P4:385, 449-50, 525; P11:153
1897 I (*f* 1896) Perrine.....P4:332, 334, 386; P5:49
III (*b* 1897) Perrine.....P5:390-1, 438
1898 I (*b* 1898) Perrine.....P6119-20, 181, 248-50, 355, 414, 475; P7:220
II (*a* 1898) Perrine (See Comet Winnecke...P5:440, 557; P6:57, 251
III (*d* 1898) (See Comet Encke.)
IV (*f* 1898) Hussey (See Comet Wolf.)
V (*g* 1898) Giacobini.....P6:357, 415; P10:211
VI (*e* 1898) Perrine.....P6:306, 356-7
VII (*c* 1898) Coddington-Pauly P6:305, 356, 358; P7:220, 388; P9:213
VIII (*j* 1898) Chase.....P6:583; P7:44, 97, 166, 271, 328
IX (*h* 1898) Perrine.....P6:474-5, 513
X (*i* 1898) Brooks.....P6:533-4, 556; P12:351
Orbit of, *W. J. Hussey*.....P6:556
1899 I (*a* 1899) Swift P7:218, 274, 326
II (*d* 1899) Holmes, Rediscovery of, *C. D. Perrine*.....P7:340
(See Comet Holmes.)
III (*b* 1899) Tuttle.....P7:219, 272, 327
V (*e* 1899) Giacobini.....P7:439, 497-8, 541
1900 I (*a* 1900) Giacobini.....P8:159, 161, 216, 288, 344
II (*b* 1900) Borrelly-Brooks P8:396, 400, 403, 461, 463, 558;
P9:159; P11:565.
III (*c* 1900) Giacobini.....P9:106, 159
1901 I (*a* 1901) Great.....P9:348,404, 513; P10:154
E. A. Fath.....P9:289
(*b* 1901)—(See Comet Encke)
Hall's comet P9:352
1902 (*a* 1902) Brooks.....P10:324
III (*b* 1902) Perrine.....
.....P10:437-8, 444, 491-2, 542; P11:94, 151, 152, 154, 206
W. W. Payne.....P10:477
(*c* 1902) Grigg.....P10:438, 492
1903 I (*a* 1903) Giacobini.....P11:93, 151-2, 205, 267, 347
II (*d* 1903) Giacobini.....P11:43, 94-5, 109, 151, 154, 266
III (*b* 1903) Grigg.....P11:345, 347; P13:336
IV (*c* 1903) Borrelly.....P11:390-4, 450, 519; P12:281
Photographic observations of.....P11:394
1904 I (*a* 1904) Brooks.....P12:349, 351, 413, 415, 490, 672; P13:98, 337
II (*d* 1904) Giacobini.....P13:99, 164-5, 338
1905 II (*e* 1904) Borrelly.....P13:100, 166
III (*a* 1905) Giacobini.....P13:269-71, 404
IV (*b* 1906) Kopff.....P14:242, 301-2, 373; P15:307
V (*b* 1905) Schaer.....P13:566; P14:53-5

XUM

Volume and Page

Comet, *(Continued)*
1905 — (*d* 1905) Slipher P14: 57
VI (*a* 1906) Brooks P14: 170-2, 191
1906 I (*c* 1905) Giacobini P14: 56, 113, 173, 243, 301
Rotation of, *W. H. Pickering* P15: 100
II (*c* 1906) Ross P14: 243, 302-3
III (*f* 1906) Hough, (See Comet Holmes)
IV (*e* 1906) Kopff P14: 494, 565-7, 628
V (*d* 1906) Finlay P14: 430, 564; P15: 112
VI (*h* 1906) Metcalf P14: 630; P15: 50-1, 126
VII (*g* 1906) Thiele P14: 628-9; P15: 49-50, 111-113
1907 I (*a* 1907) Giacobini P15: 247-8, 307, 372, 631
(*b*) Mellish P15: 307, 373, 431, 569
(*c*) Giacobini P15: 431
(*d*) Daniel P15: 431-3, 504, 558, 569, 632; P16: 246, 321, 380
E. E. Barnard P16: 591
Spectrum of, *Knowledge* P15: 558
O. C. Wendell P15: 622
(*e*) Mellish P15: 569, 632-3
1908 (*c*) Morehouse P16: 505, 507-9, 578-9, 644-5, 653
Photographic observations of, *J. H. Metcalf* ... P16: 655
J. A. Miller P16: 653
H. C. Wilson ... P16: 563
An unrecorded S1: 232
in corona of April 16, 1893, *J. M. Schaeberle* A3: 515
Computing relative brightness of a A1: 943
envelopes, *E. W. Preble* S1: 280
orbit, Graphical representation, *G. C. Comstock* P6: 465
return? When will the, *Knowledge* S1: 224
seeking, *W. R. Brooks* P7: 157
Science Observer S1: 70
strike the earth? Might a, *F. Campbell* P8: 253
Comets of 1881 ..... S1: 10, 14
1882, *W. W. Payne* S2: 119
1886, *Astronomische Gesellschaft* S6: 201
W. C. Winlock S6: 112
1887 *H. C. Wilson* S7: 153
1887-8 *O. C. Wendell* S9: 38
1889 ..... S9: 184
1892 *H. C. Wilson* A2: 121
1894 ..... P2: 384
1906 *H. Kreutz* P15: 421
Additional points relating to, *G. W. Coakley* A1: 652
to asteroid zone, Relation of short period, *D. Kirkwood* S7: 177
captured by planets, *H. A. Newton* A1: 12
Chief discoverers of, *W. F. Denning* S9: 235

Volume and Page

Comets, *(Continued)*
Chief discoverers of, *L. Swift*.....S9:122, 189
Composition, purpose, and effect upon the earth of, *L. Boss*.....S1: 1
designated.....S3:201; S4:5; S5: 50
Determination of positions of, *M. W. Whitney*.....P4:177
Dissipation of, *W. H. S. Monck*.....S7:239
Galle's catalogue of.....S4:264; S5:5, 41
Geometrical considerations applied to velocity of, *J. B. Wood*.....P15:553
Meteoric theory of, *W. H. S. Monck*.....S9:216
Models representing orbits of, *W. Harkness*.....S6:329
Motion of, when far from the sun, *G. C. Comstock*.....P10:169
Naked eye, *W. F. Denning*.....P15:411
Optical appearances of, *S. V. Clevenger*.....S6: 89
Origin of, *D. Kirkwood*.....S6: 77
Our knowledge of, *H. C. Wilson*.....S5:257
repelled by the sun? Are the, *G. W. Coakley*.....A1: 97
to return in 1890, Periodic.....S9: 37
Short period.....S1:9, 71
Spectra of, *H. Kayser*.....A3:204
Tails of, *E. E. Barnard*.....P12: 1
A. J. Pigeon.....S7:457
C. A. Ranyard.....S2:81; S3:184
Tidal theory of, *G. W. Coakley*.....A1:177
Tides of, *R. S. Tozer*.....P13:489
Velocity of, *J. B. Wood*.....P13:140
and meteors, *W. F. Denning*.....P10: 69
W. H. S. Monck.....A1:171, 274
and their families, *W. W. Payne*.....P6:1, 70, 143, 228
Comet-meteor radiants, *O. C. Wendell*.....S4:153; S5:152; S6:359
Comet-seeker, New form of, *G. A. Hill*.....S7:241
Cometary computation, *S. C. Chandler*.....P6:459
Cometic orbits, Statistics of.....S3:183
Common's 60-inch telescope, *E. C. Pickering*.....P12:660
Computing, The art of, *R. Buchanan*.....P15:287
$\phi - \phi'$ and ρ, *F. Rust*.....P15:484
Conference, International meridian.....S4: 14
Conservation of energy, Results from principle of, *P. E. B. Jourdain*.....P13: 36
Constant k, Significance of.....P2:281
Constants determined by the U. S. C. & G. Survey, *E. D. Preston*.....P6:101
of precession, nutation and aberration, Change of.....P5:274
Constellation study, *W. Upton*.....P1:1, 50, 115, 257, 308, 363, 391, 449
Constellations.....S4:150
Methods of tracing, *W. A. Rogers*.....S8:145
Construction of the heavens, *H. Macpherson, Jr.*.....P14:385
Co-ordinates, Summation of, *H. M. Parkhurst*.....S5: 53
Corona, Solar, *I. E. Christian*.....P7: 28

XUM

Volume and Page

Corona, Solar, *(Continued)*
W. Huggins.....S4:136, 167
W. W. Payne.....S2:152; S8:418, 425; S9: 93
Actinic brightness of the, *E. S. Holden*.....S9:215
on April 16, 1893, *J. M. Schaeberle*.....A2:693, 730; A3:307
Colors in the, *J. Ennis*.....S6:273
Extent of the, *E. S. Holden*.....S8:267
Objections to theory of the, *C. S. Hastings*.....S2:307
Origin of disturbed region of, *C. D. Perrine*.....P10:398
photographed in daylight, *D. E. Packer*.....P3:361
Photographing the, *W. B. Featherstone*.....P8:250
W. Huggins.....S1:282; S4:283
W. W. Payne.....P7:516
Burckhalter's apparatus for.....P8:493
Probable nature of the, *C. G. Abbott*.....P16:519
South polar rays of the, *J. A. Brashear*.....S8:192, 224
Spectrum of the.....P15:500
seen after totality, *A. C. De P. P. Maury*.....P8:401
without an eclipse, Observing, *G. E. Hale*.....A2:751
E. Miller.....P8: 80
M. I. Puppin.....A2:362
(note).....P8:106
Photographing, *G. E. Hale*.....A2:260, 364; A3:662
γ *Coronae Australis,* Elements of, *H. C. Wilson*.....S5:251
U *Coronae Australis,* (5484) *P. S. Yendell*.....P3:150
Cosmic masses overweigh the stars, Transparent, *A. von Brandis*.....P14:162
physiology, Historic notes on, *T. S. Hunt*.....S1: 50
Cosmogony, The new, *J. E. Gore*.....P14:515
Crater Linné, Observation of, *J. H. Stebbins*.....P14:510
Crimson stars, Two, *R. O'Halloran*.....P6:254
Crossley reflector, Photographic efficiency of, *W. W. Payne*.....P8: 4
Cubic equation with three real roots, *C. Gilpin, Jr*.....P14:641
Cygnus, Nova, *E. C. Pickering*.....S9:232
δ *Cygnus,* Origin of.....S9:428
λ *Cygnus,* O Σ 413, Orbit of, *S. W. Burnham*.....P4:397
61 *Cygnus, N. M. Mann*.....S2:18; S10: 13
61 *Cygnus,* Parallax of.....S4:284; S8:277
61 *Cygnus,* Proper motion of components of, *S. W. Burnham*.....S10: 1
note.....A3: 85
61 and 61^2 *Cygnus,* Parallaxes and connection of, *H. S. Davis*.....P6:487
P *Cygnus,* Spectrum of, *J. E. Keeler*.....A2:361
SS *Cygnus,* Variable star, *J. A. Parkhurst*.....P6:156; P7:138
TX *Cygnus,* Period of.....P10:215
UY *Cygnus*.....P11:333
U^3 Cygnus, *R. O'Halloran*.....P9:518
(See Variable stars)

Volume and Page

Dark-room, Ideal, *British Journal of Photography*....P11: 16
Day of week on which date falls, To find, *A. Rydzewski*....P7:416
Deviation of falling body from the vertical, *H. C. Wilson*....P5:186
Dial of Ahaz, (See Sun-dials of Ahaz.)
Diazenital, Communication about, *Fr. Nusl and J. Fric*....P13: 16
Differentials of area and volume, *A. Hall*....P10: 5
New proof for, *J. Fricklin*....S2:209
Diffraction, *H. M. Parkhurst*....S5:200
grating replicas, *T. Thorp*....P14: 93
gratings, *A. Cornu*....A3:207
(See Rowland's Gratings)
Domes, Rotation of, *G. W. Hough*....S2:133
Doppler's principle applied to motion of binaries, *T. J. J. See*....A2:812
Double motion mechanism, New forms of, *F. L. O. Wadsworth*....A3:527
Double star, Lost, *S. W. Burnham*....P11:250
E. Doolittle....P13:398
measures, *S. W. Burnham*....P13: 15
Poulkowa, *S. W. Burnham*....A3:354
notes, *G. W. Hough*....A1:349
observations, *G. C. Comstock*....S9: 78
of Dembowski....S1: 67
F. E. Seagrave....S2:22, 274
at Cape of Good Hope, *S. W. Burnham*....P13:333
Flower observatory, *S. W. Burnham*....P10:129
Errors in, *H. C. Wilson*....S5:174, 211
observing, Hints on, *S. W. Burnham*....S1:25, 73
O. Stone....S1: 95
orbit, Finding by graphical method, *S. W. Burnham*....P1:243, 349
H. N. Russell....P6:149
T. J. J. See....A2:581, 865
Studying, *N. M. Mann*....S3: 93
systems, Evolution of, *T. J. J. See*....A2:289
work, Poulkowa, *A. Struve*....S5:193
Recent, *S. W. Burnham*....P14: 79
95 *Ceti* (A.C. 2) *S. W. Burnham*....A2:681
30 and 41 *Geminorum, H. Sadler*....S5:218
β 107, *S. W. Burnham*....P7:1; P8:528
β 182, *S. W. Burnham*....P8:530
β 962, *S. W. Burnham*....S8:356
BD + 24°2733, Proper motion of....P10:552
DM + 17°573....A1: 92
H 2904, *S. W. Burnham*....S5:56, 93
H 2948, Measures of, *S. W. Burnham*....A1:173
h 3823, and *h* 4321, *F. P. Leavenworth*....S7:172
Σ 186, *S. W. Burnham*....S10: 72
Σ 503, *M. W. Whitney*....S10:300

XUM

Volume and Page

Double star, *(Continued)*
Σ 1216, *S. W. Burnham* ... A1:662; P5:450
Σ 1321, Proper motion of, *F. W. Backhouse* ... S10:377
S. W. Burnham ... S10:168
Σ 1603, Proper motion of, *S. W. Burnham* ... A1:549
Σ 1864, Proper motion of, *S. W. Burnham* ... A1:870
Σ 2145, *H. C. Wilson* ... A2:112
Double stars, *R. G. Aitken* ... P13: 65
Edinburgh Review ... P11:299
catalogued at Lowell observatory, 500 ... P6:189
discovered at Washburn observatory, *S. W. Burnham* ... S9:299
distances of, *W. H. S. Monck* ... S7:290
Evolution of, *C. H. Darwin* ... A2:413
Measures of 748, *S. W. Burnham* ... S3: 67
Micrometrical measures of ... A2:282
Proper motions of, *S. W. Burnham* ... A3: 14
F. P. Leavenworth ... S8: 77
Draper, Henry, N. Y. *Tribune* ... S1:258
Dumb-Bell nebula stars, Proper motion of, *E. E. Barnard* ... A3:445
Durchmusterung, Revision of the Cape ... P12:686
— 2° to — 23°, Schoenfeld's ... S3:154
south of — 23°, Stone's, *E. S. Holden* ... S1: 46
Durer contributions to astronomy, Raphael and Albrecht, *E. S. Holden* ... S9:121
Dust envelope, Vast, *S. P. Langley* ... S3: 21
particles in the air ... S9:234
Earth, Annual motion of the, *J. Haywood* ... S7:286
Attraction and figure of the, *W. W. Payne* ... P8:177; P9:7, 117
before earth-moon catastrophe, *G. D. Swezey* ... P15:397
Clairaut's theory of the figure of, *A. Hall* ... P9: 60
Evolution of, *S. Houghton* ... S1:147
Mean density of, *J. H. Poynting* ... P3:232
measured, How, *J. E. Gore* ... A2: 26
Rigidity of the, *T. J. J. See* ... P16:602
tremors, *H. A. Howe* ... S8:448
Visible shadow of, *J. Haywood* ... S4:243
Waters upon the, *E. J. Brookings* ... S8:301
and luminiferous ether, Relative motion of, *A. A. Michelson and E. W. Morley* ... S6:306
and moon, Comparison of features of ... P12:627
Earth's annual motion, Visualizing, *E. A. Bowen* ... P1:178
J. B. Pence ... P2: 46
L. Swift ... P1:240
atmosphere, Mass of ... A1:930
attraction due to spheroidal form ... P14:318
axis, Oscillation of ... S10: 47
Position of, *O. E. Harmon* ... P2:219

Volume and Page

Earth's, *(Continued)*
consolidation, Age of, *T. J. J. See*....P15:545
motions, Concerning, *G. S. Hodgins*....P8: 60
rotation proved P12: 71
Ptolemy's argument against, *H. Hancock*....S9:293
way, Apex of, *T. J. J. See*....P1:373
Earthquake, Feb. 23, 1892, *W. H. Pickering*....A1:470
April 18, 1906, and Lick observatory, *W. W. Campbell*....P14:379, 441
Earthquakes, New theory of, *T. J. J. See*....P16:199
Objections to new theory of, *G. M. Crowl*....P16:394
Eclipse of Agathocles, *W. T. Lynn*....P13:201
S. Newcomb P13:199
aid to chronology, *R. W. McFarland*....P10:172
Q. A. Wheat....P10:19, 138, 207
cycle, *W. H. S. Monck*....P10:240, 276
cyclones, *H. C. O. Annals*....P9:204
phenomenon, *J. F. Lanneau*....P9: 67
photography, *A. Taylor*....A2:267
of Thales, *W. T. Lynn*....P9:577
W. H. S. Monck....P10:127
J. N. Stockwell....P9:376
Eclipses, *J. Morrison*....P4:308, 502
Ancient, *W. H. S. Monck*....P11:131, 242
E. Nevill....P14:616; P15: 32
and chronology, *R. W. McFarland*....P7:510; P9:176
computed by students, *H. A. Howe*....S4:205
explanation of researches on ancient, *W. W. Payne*....P14: 86
Graphic method for lunar, *K. Laves*....P15:533
Lunar:
1888, Jan. 28....S7:35, 121, 361
1889, Jan. 16, partial, *E. E. Barnard*....S8:137
1891, Nov. 15....A1:91, 92; S10:421, 467, 521
1892, Nov. 4 ....A1:834
1894, partial, March 21....A3:165
partial, (Sept. 14)....A3:594, 705; P2: 38
1895, March 11, *L. A. Eddie*....P2:449
L. Swift P3:269
notes P3:101-4
1899, Dec. 16, Changes during, *W. H. Pickering*....P8: 57
Occultations during P8:107
notes P7:330, 540
1902, Oct. 16, Chamberlin observatory....P10:549
H. A. Howe....P10:548
C. J. Ling....P10:553
R. O'Halloran P10:551
D. S. Swan....P10:548

XUM

Volume and Page

Eclipses, Lunar, *(Continued)*
1902, Oct. 6, *L. Swift*.....P10:503
W. W. Payne.....P10:480
1906 Coming total.....P14:3, 185
and occultations, *G. W. Coakley*.....S4:207
Graphic construction of, *W. F. Rigge*.....
P3:183, 247, 310, 353, 414, 454; P4:67, 123, 184
in one year, Seven, *F. H. Burgess*.....S8:40, 135
R. W. Prentiss.....S8: 85
Mathematical theory of, *W. W. Payne*.....P12:515
Scientific value of total, *C. E. Furness*.....P3:109
Solar, *J. Morrison*.....P5:29, 129, 368
1882, June 17.....S1:128
1883, May 6.....S1:152, 194; S2:24, 141, 179
1885, March 16.....S4:90-4, 120, 123-6, 147, 181, 219
1886, Aug. 29.....S5:54, 282, 313
1887, Aug. 19.....S6:105, 262, 292; S7:1, 161, 222
1889, Jan 1....S7:123, 448, 454; S8:64, 88, 234; S9:92-4, 238; S10:253
J. A. Brashear.....S8:120
C. Burckhalter.....S8: 97
C. W. Irish.....S8:166
W. W. Payne.....S8: 64
W. H. Pickering.....S8:337
W. Upton.....S8:118
1891, June 6.....S10:242
1892, Oct. 20, *H. A. Howe*.....A2: 88
notes.....A1:627, 838, 839
1893, April 16, *J. King*.....A1:863
H. S. Pritchett.....A1:454, 562
notes...A1:838-9; A2:373, 461, 645; A3:82, 162; P3:211.
1894, April 5.....A3:250
eclipses.....A3:70, 595
1896, Aug. 8-9, *A. Fowler*.....P4: 28
notes.....P3:270; P4:44, 221, 389
1897, July 29.....P5:162, 268-9
1898, Jan. 22, *Nature*.....P5:378
H. C. Wilson.....P5:251
notes.....P5:498, 561
observed at Ahmednagar.....P6:121
Buxar.....P6:123
Talni.....P6:124
by U. S. expedition.....P6:125
1899, June 7.....P7:330
1900, May 28, *E. B. Frost*.....P8: 86
C. P. Howard.....P8:550; P9: 18

Volume and Page

Eclipses, Solar, *(Continued)*
1900, May 28, *M. Moye*.....P8:368
W. W. Payne.....P8:370
W. H. Pickering.....P8:225, 289
H. C. Wilson.....P8:240, 297
notes, P8:103, 108, 144, 153, 220, 224, 291, 295, 346 350, 398, 400, 407, 462, 464.
1901, May 18.....P9:276; P11:577
in Sumatra, *E. E. Barnard*.....P9:527
A. N. Skinner.....P10: 1
1905, Aug. 30, *G. Bigourdan*.....P14: 28
W. W. Campbell.....P12:456
M. Moye.....P13:523
D. Todd and *R. H. Baker*.....P13:240
notes.....P13:473, 491
Polarization observations.....P14:189
Burgos, *C. P. Howard*.....P13:542
V. Ventosa.....P14:151
Egypt, *E. F. Hussey*.....P14:129
Leander McCormick observatory, *O. Stone*.....P13:574
Vinaroz, *A. L. Cortie*.....P13:575
visible in the U. S., *W. F. Rigge*.....P13:134
1908, Jan. 3, in U. S., *W. F. Rigge*.....P15:610
June 28, *R. O'Halloran*.....P16:516
in U. S., *W. F. Rigge*.....P16:271
W. Upton.....P16:456
Eclipses 1882 and 1905 compared.....P14:125
teach us, What solar, *D. Todd*.....P9:305
Electric circuits to eye end of equatorial, *W. W. Dinwiddie*.....P10:300
controls for astronomical instruments, *F. L. O. Wadsworth*.....A3:265
of equatorials, *W. C. Gurley*.....A3:641
G. W. Hough.....A3:524
lighting, Experiments in, *H. A. Howe*.....A2:505
phenomena in solar system, *J. Haywood*.....S5: 81
Electrical discharge discussed by Prof. Schuster.....A1:739
discharges through poor vacua, *M. I. Puppin*.....A1:483
Electro-magnetic induction, *M. A. Veeder*.....A2:264
Elements, neon and metargon, *Journal of Chemistry*.....P6:345
Elkin, W. L., Astronomical work of, *S. C. Chandler*.....P3:392
Ellipse passing through five points, *R. J. Adcock*.....S9:223
H. H. Furness, Jr.....S9:200
C. E. Myers.....S9:268
Ellipses, Practical method of drawing, *W. H. Pickering*.....P16:147
Ellipsograph and protractor, *S. W. Burnham*.....P4:181; Cor. P4:336
Elliptic motion, *A. Hall*.....P13:287
Elongation of *Polaris*, Tables for, *L. G. Weld*.....S9:269

XUM

Volume and Page

English mile, *J. M. Clark*.....S9:155
Enlarging photographic lens, *S. W. Burnham*.....A1:558
Envelope of sphere, Rotation upon, *S. J. Corrigan*.....S7:369, 420; S8: 49
Envelopes, Phenomena of cooling, *F. H. Bigelow*.....S6:170
Ephemerides, Astronomical, *J. Morrison*.....P2:301
Ephemeris, Lunar, *J. Morrison*.....P3:362, 467
of planet or comet, Computation of, *M. C. Traylor*.....P9:311
Planetary, *J. Morrison*.....P4: 32
Sidereal, *J. Morrison*.....P4: 90
Solar, *J. Morrison*.....P2:406; P3:25, 86
Equation of the spectrometer.....A1:932
Equator, Constants for, *R. Buchanan*.....P16:346
Equatorial axis on ball bearings, *F. L. O. Wadsworth*.....A3:723
of Chamberlin observatory, *H. A. Howe*.....A3:709, 826
like Lick's, *H. S. Pritchett*.....S5: 65
telescope, Adjustment of, *H. A. Howe*.....P3:131, 193
K. Laves.....P8:424, 535; P9: 13
note.....A3:171
6 *Eridani*, Motion of, *S. W. Burnham*.....A2:587
0^2 *Eridani*, *A. Hall*.....S1: 94
Eros (433) (1898 DQ), Witt's planet, *S. C. Chandler*.....P7: 26
A. Hall.....P6:567, 584
W. W. Payne.....P7:20, 278; P8:445
E. C. Pickering.....P6:530; P7: 66
G. Ravene.....P6:558
Campaign of, *H. C. Wilson*.....P9:214; P12:683
Double planet, *H. C. Wilson*.....P9:277
Elements.....P6:470, 531; P7:107, 502; P8:102; P10:326
Ephemerides.....P8:41, 345, 350, 560; P9:358; P10:326; P11: 47
Measures of.....P8:519; P12:286
Notes.....P6:470, 531, 567; P7:107, 502
Observations of, *M. Loewy*.....P8:488
Goodsell observatory.....P9:108, 167
Lick observatory.....P8:519
Notes.....P8:345, 350, 521, 564; P9:50, 108, 167; P10:326
Tables for.....P8:437
Opposition of, 1900, *E. C. Pickering*.....P8:350
1903, *M. C. Traylor*.....P9:496
1905, *E. C. Pickering*.....P11:501
notes.....P8:563; P11:47, 501
Orbit of.....P7:502
Photographs of, at Arequipa, *E. C. Pickering*.....P13:350
university, Minnesota.....P9:168
measured.....P10:388
Positions in 1893, 1894 and 1896, *E. C. Pickering*.....P8:405

Volume and Page

Eros, *(Continued)*
Rediscovery of P10:382
Reduction of 295 photographs, *A. R. Hinks* P12:531, 589
note P12:501
Variability in light of, *E. C. Pickering* P9:290, 358
notes P9:213; P10:277
Visibility of, *E. C. Pickering* P10:546
and solar parallax, *A. R. Hinks* P11:439
notes P9:465; P12:683
Errors of a divided circle, *R. H. Tucker* P11:523
Ether, *F. H. Getman* P7: 86
Concerning the constitution of, *L. d'Auria* P15:101
proved, Existence of all-pervading, *G. P. Fitzgerald* S7:386
and gravitation, *W. H. S. Monck* P1:409
Euler-Lambert equation for parabolic motion, *A. Hall* P8: 2
O. C. Wendell S9:176
European trip, *J. A. Brashear* S7:392; S8: 7
Expeditions: Astronomical, Argentina P16:460
Arizona A3:316
Peru S10:105
Southern hemisphere, *H. D. Curtis* P12:687
Eclipse, 1889, Goodsell observatory S8:177
Lick observatory S8:339; S9: 94
U. S. Naval observatory S9: 97
Washington university S8:122
1893, English A2:271; A3: 82
1896, to Japan P3:379
1898, to India P5:225, 561; P7:449
Lick observatory P6:231
1900 ..... P8:289, 291, 295, 296
1901, Amherst party P9:276
Crocker, *W. W. Campbell* P9:221
1905, *M. Proctor* P12:468; P13:90, 225
U. S. Naval observatory P13:527
Polar, Zeigler P16:194
Solar research, from Yerkes observatory P12:503
Eyepieces, Magnifying power of, *C. C. Hutchins* S8:326
Faculae, *G. E. Hale* A3:113
and prominences, *J. Evershed, Jr* A2:628
Faith and the fourth dimension, *H. Jacoby* P16:298
Criticism of, *W. H. Johnston* P16:615
February Sundays, Determining five, *F. Campbell* P11:167
T. C. Running P11:218
Field-glass, How and why of the Porro prism, *W. R. Warner* P10:281
Figure of the sky, Observational determinations of apparent, *W. C. Brenke* P9:351

XUM

Volume and Page

Films, Photographic P16:656
on glass, Distortions of photographic, *S. Albrecht* P15:463
Filter Yellow K, *C. E. K. Mees* and *S. H. Wratten* P14:572
Fireball, *W. F. Denning* P5:167
H. A. Howe P9:107
L. L. Stingley P9:426
Flower observatory, university of Pa., *C. L. Doolittle* P5:122
A. W. Quimby P5:112
Focal point of lens of long focus, *G. A. Hill* P11:379
Foley's tables for computing precession, etc., *E. S. Holden* S1: 63
Free escapement with independent balance, *D. Appel* A1:872
Funds, Gould, Research, etc., See "Awards."
Galaxy, Collection of Sirian stars, *W. H. S. Monck* A2:381
Gases, Constitution and function of, *S. J. Corrigan* P4:247
Gauss and Bessell, Sayings of, Translated by *B. Trier* P13:231
Gegenschein, *E. E. Barnard* S2:254
I. E. Christian P9:146
Cause of, *J. R. Holt* P2: 94
Explanation of, *W. H. Pickering* P8: 1
Observations of, *A. E. Douglass* P2:29; P5:178
Parallax of, *J. Evershed, Jr* P7:289, 352
Principle of P2: 87
and zodiacal light P6:366
or zodiacal light, *E. E. Barnard* P1:337; P7:169
Geminorum (12.1903) before its discovery, Nova, *E. C. Pickering* ... P11:261, 339
Chart and catalogue for observing, *J. G. Hagen* P11:341
Comparison stars for Nova, *J. A. Parkhurst* P11:328
Discovery of P11:340
Notes, *Z. Daniel* P11: 96
L. G. Léon P11:277
C. D. Perrine P11:512
H. C. Wilson P11:258
4 *Geminorum* occulted by Jupiter, *J. Tatlock, Jr* S5:254
H. C. Wilson S1:311
Geneva observatory P9:162
Geometrical construction of absorption lines of solar spectrum, *G. Higgs* A2:547
Georgetown observatory work P5:221
Gibbs, Josiah Willard, *H. A. Bumstead* P11:446
Glass for lenses, New P12:425
optical purposes, *J. A. Brashear* P6:104
telescope objectives, *J. A. Brashear* P1:221, 241, 447
Goodsell observatory, Astronomical work at, *H. C. Wilson* P11:179
expedition to Montana P12:506
Graduation corrections for fundamental observations, *R. H. Tucker* P14:321
errors, Ultimate measurement of, *R. H. Tucker* P12:579

Volume and Page

Grating, Rutherfurd's photography and diffraction S1: 68
to study stellar spectra, Concave, *H. Crew* A2: 156
Gratings, New ruling engine for S1: 61
for optical purposes, *H. A. Rowland* S1: 116
in theory and practice, *H. A. Rowland* A2: 129
Gravitation, *J. E. Ayer* P13: 170
F. J. B. Cordeiro P13: 8
Attempt to replace Newton's law of, *K. Laves* P5: 513
constant, Value of, *C. V. Boys* P3: 128, 167; P4: 77, 120
G. K. Burgess P10: 421
W. A. Rogers P3: 316
H. Seeliger P5: 474, 544; P6: 40
C. A. Young P3: 153, 382
with altitude, Variation of, *H. Crew* A3: 404
Gravity, Constant of S9: 141
Force of, *E. S. Holden* S9: 44
meters, Differential A2: 366
Greenwich, World's meridian S3: 273
"Gregorian," Historic, *A. W. Quimby* P5: 482
Growth of worlds, *W. W. Payne* P6: 346, 401; P7: 124
Gyroscope, *F. J. B. Cordeiro* P15: 81, 146
Habitability of other worlds, *H. A. Howe* S4: 294
Hagen's astrophotographic journey, Father, *W. F. Rigge* P15: 326
Halley, Dr. Edmond, Bibliography of, *E. F. McPike* P13: 579; P14: 425
Remarks on, *E. F. McPike* P12: 453
Halley's comet in 1835, *P. Bronte* (See Comet Halley) P12: 571
Hansen's moon tables, Correction of P14: 505
Harvard observatory equipment P9: 111
Growth of, *E. C. Pickering* P8: 89
Photographic flashes from, *H. R. Donaghe* P6: 481
Heat radiation of the stars, *G. E. Hale* P7: 503
Heavenly bodies, *D. Kirkwood* P1: 205
Heavens in winter, *A. K. Bartlett* P13: 30
Heiss, Edward, *W. F. Rigge* P14: 332
Helium terrestrial? Is, *W. W. Payne* P3: 16
Hencke, Dr. Karl Ludwig, *W. Foerster* S10: 20
M 13 *Herculis, E. E. Barnard* P8: 486
52 *Herculis, S. W. Burnham* A1: 465
RX *Herculis*, Light curve of P10: 158
ξ *Herculis*, Motion in line of sight, *A. Belopolsky* A3: 130
Herschel, Caroline, *E. A. Dent* P11: 123
Hertha, minor planet, (See Asteroids) (135) S2: 314
Hindu astronomer, *W. E. Plummer* P7: 244
Hipparchus, Precision of P14: 638
Hole in the heavens, Herschels on the S2: 125

XUM

Volume and Page

Huggins, Dr., Recent papers of, *C. A. Young*.....S8:289
Hussey's measures of the O Σ double stars, *S. W. Burnham*.....P9:553
10th catalogue of 100 new double stars, *S. W. Burnham*.....P13:473
Hyades, Occultations in the.....S4:286; S5:28, 224; S6:163
H. C. Wilson.....P12:611
α *Hydrae*, Variable.....S2:277
ε *Hydrae*, *S. W. Burnham*.....S8:207
Hydrogen envelope of star DM + 30°3639, *W. W. Campbell*.....A2:913
Secondary spectrum of, *G. E. Hale*.....A3: 57
Hymn, *G. Huntington*.....S5:268
Hyperion, Motion of.....S9:236
Hyperspace, Philosophy of, *S. Newcomb*.....P6:380
Ice age, Astronomical theory of.....P10:168
So-called, *L. Swift*.....P10: 88
Illinois university observatory, *G. W. Myers*.....P6:319
Illusion and its cause, *R. M. McCreary*.....P7: 11
Immensity and minuteness, *J. E. Gore*.....P10:225
Index of refraction and dispersion, *B. Hasselberg*.....A2:455
Inhabited? Are other worlds, *D. E. Wing*.....P11:536
Instruments for transportation, Packing, *S. C. Snell*.....P8: 88
Some new astronomical, *F. Schlesinger*.....P10:427
Integral reduced by hyperbolic functions, *F. Rust*.....P15:581
Interpolation, *R. T. A. Innes*.....P9:389
Theory and practice of.....P8:402
Intersecting rainbows, *C. W. Pritchett*.....S7:219
J. G. Hagen.....S7:266
Interstellar medium, Integrity of, *D. Wood*.....P1:224
Intra-Mercurial planets, *S. J. Corrigan*.....P5:89, 139
G. Davidson.....S3:113
H. Harrison.....S3:135
L. Swift.....S2:122, 242
Distances of.....S8:473
Observations of.....S6:84, 117, 196
Probability of four, *S. J. Corrigan*.....P4:414
Search at eclipse for, *C. D. Perrine*.....P10:460
Invisibility of transparent objects, *R. W. Wood*.....P11:202
Invisible, How to measure the, *H. M. Parkhurst*.....S9:406, 442
Iris (See Asteroid 7) Variability of, *E. C. Pickering*.....P12:258
Iron as a comparison spectrum, Spectrum of, *H. C. Vogel*.....A1:151
Janssen's visit to Mont Blanc observatory, *W. W. Campbell*.....A2:858
Jena glass for telescopes.....S8:282
Jovian phenomena, *G. W. Hough*.....P11:297
A. S. Williams.....P11:361
Julian period, *R. W. McFarland*.....P14: 98
Jupiter, *G. W. Hough*.....P2:145; P8:381; P10:393
A. S. Williams.....P11:188

Volume and Page

Jupiter, *(Continued)*
Determining longitude on P13:229, 573
family of comets, *W. W. Payne* A2:800; P1:25, 62; P14:124, 221
Great red spot on, *E. E. Barnard* A1:93, 686; A3:736; P2:129; P16:523
W. F. Denning S5:62, 281; S9:140; P14:34; P15:606
G. W. Hough S4:289; S5:183; S6:325; S10:378
A. S. Williams P15:560
C. A. Young S4:119; S5:289
Notes on S3:216; A2:925; P16:391
Hypothesis regarding surface markings of, *A. E. Douglass* P8:473
in 1889, J. E. Keeler's observations of S9:107
1896, Physical aspect of, *H. F. Griffiths* P4: 25
1896-7 ..... P6:421
Markings of, *W. W. Payne* P14:608
M. W. Whitney A2: 22
Mass of A3:786
E. S. Holden S1: 66
Motion of great red spot on, *W. F. Denning* P9:488; P10:460; P15:398
Motions of spots and markings, *E. E. Barnard* S10:413
observations, *S. F. Whiting* P16:457
with naked eye P1:240
16-inch equatorial, *H. C. Wilson* A1:189
Occultation of, *E. S. Martin* A2:276
W. H. Pickering S9:138
at opposition, *E. A. Bowen* P1:133
G. W. Hough P3:519
Physical constitution of, *G. W. Hough* A3:89; P11: 63
Present knowledge of surface of, *G. W. Hough* P13: 19
Rotation of, *G. W. Hough* P7:62; P11:114
P. Lowell P11: 1
note on P7:332
Spectrograms of, *V. M. Slipher* P11: 1
Spots and markings of, *G. W. Hough* A1:193
Visibility of satellites of P9:414
and Saturn, Synodic period of, *R. Buchanan* P16: 65
Jupiter's dark spots in north tropical region, *W. F. Denning* P7: 14
satellites, *E. E. Barnard* A3:438
W. H. Pickering A2:193, 390, 481; A3:728
in 1664, *Nation* P1:288
Disks of, *E. E. Barnard* A3:272
A. E. Douglass A3:517
W. H. Pickering A3:423
invisible, Four of P15:191
Shadow of A2:925
visible to naked eye, *T. J. J. See* P6:257
I S5:155; S8:424; S10:517; P10:551

XUM

Volume and Page

Jupiter's satellites, *(Continued)*
II.....S5:155; S8:424; A3:357
III S2:31, 130; S3:124; S4:158; S5:125, 155; S9:426, 474; S10:431, 515; A1:94; A3:357; P9:411; P10:447, 551; P11:460, 513; P12:682.
E. E. Barnard.....A3:821
A. E. Douglass.....P5:308
IV S3:155; S4:124, 155, 186; S5:155, 184; S8:424; S9:429; A1:93; A3:357; P2:333; P11:574, 575.
V A1:749, 840, 945; A2:573, 756, 788, 856; A3:556, 781; P1:76, 87; P7:502; P8:48; P10:447; P11:407; P12:425
E. E. Barnard.....A1:749; A3:556; P1: 76
G. W. Hough.....A1:945
VI.....P13:106; P14:640; P15:110; P16:130
VII.....P13:225, 413; P14:430, 640; P16:130
VIII.....P16:246, 388, 491
Orbit of, *R. T. Crawford* and *W. F. Meyer*.....P16:491
southern equatorial belt, *L. Swift*.....S9:474
Keeler, J. E., Director Lick observatory.....P6:186
Keeler's, J. E., remains removed to Allegheny, Pa.....P14:311
Kepler's attitude towards astrology, *F. A. Tondorf*.....P12:299
correspondence, *J. G. Hagen*.....S6:109, 133, 212
equation, Important method of solving, *F. R. Moulton*.....P3:136
Solution of, *A. A. Rambaut*.....P14:423
problem, *J. Tatlock, Jr.*.....S7:453
Kinetic theory of gases, *L. d'Auria*.....P15:210, 357, 385; P16:241
Kirchhoff's law, Pringsheim on, *H. Crew*.....A1:581
Kirkwood, D., *W. W. Payne*.....P1:167
Kodaikanal solar physical observatory established.....P14:505
Lacaille, 8262, Proper motion of, *E. S. Holden*.....S2:256
Lacertae, Nova, *M. Fleming*.....A1: 27
Lalande 4219, *F. P. Leavenworth*.....S6: 80
16616, Proper motion of, *E. Frisby*.....S4:185
Lane, J. Homer, Historical sketch of, *T. J. J. See*.....P14:193
Lanes, Law of, *T. M. Blakslee*.....P13:111
Lantern, Projection distances in, *H. W. Griggs*.....P15:316
slides, Relief in.....P16:588
La Place, Historical eulogy on, *Baron Fourier*.....P3: 1
Latent image in photography, Nature of the.....P14:123
Latitude and azimuth, Simultaneous determination of, *J. S. Cortie*.....S10:189
at Greenwich, Latest.....S9:330
New York, Variation of, *J. K. Rees*.....P8:169
determination, *A. M. Lamb*.....S5:179
by zenith telescope, *T. H. Safford*.....S9: 45
by elongation, *O. J. Klotz*.....P3:199
Periodic and secular variations of.....A1:176

Volume and Page

Latitude, *(Continued)*
Photo-chronograph applied to determination of A1:633
variation, *E. Doolittle* P3:105
C. L. Doolittle P7:390
A. M. Lamb S4:129
Observatory P11:381; P14:469
W. W. Payne P12:662
T. H. Safford S9:422
notes S8:422; S9:422; A1:175
at Cincinnati P16:452
German work on, *H. Jacoby* A1:471
Observations of commission of 1907 ..... P16:453
LaPlace on, *A. B. Hancock* P2:349
Periodic law of P4: 27
and azimuth, Determination of, *J. S. Cortie* S10:189
Law of attraction of stellar systems S9:423
Laws of falling bodies, *J. G. Hagen* S4: 15
Lens, How to make a, *G. S. Jones* S10: 68
Leonids, (See Meteors)
α *Leonis, (Regulus)* Occultation of, *C. B. Hill* P14:440
W *Leonis*, Occultation of, *J. F. Cole* P10:331
Level, Clark's new, *W. A. Rogers* S1:210
Levels, Defects of sensitive, *G. C. Comstock* S10:299
Deflection of the, *J. G. Hagen* S3:75, 107
5 M *Librae*, New variable, *D. E. Packer* S9:381; S10:107
Lick observatory, Mills expedition from, *W. W. Payne* P15:522
work, *E. S. Holden* P5:181
telescope, *E. S. Holden* S7:296
disturbed by winds A2:572-3
(36-inch), Comparative power, *W. W. Campbell* P16:560
(40-foot) for expedition, *J. M. Schaeberle* P1: 72
Life in other worlds, *D. T. MacDougal* P7:420
E. C. Mason P6:520
Light fluctuations of variables, Relation of, *G. W. Myers* P6: 7
Limit of solar and stellar, *W. Huggins* S9: 22
Measures of velocity of, *S. Newcomb* S5:15, 68
in space, Dispersion of, *Observatory* P16:521
Speed of P2:138
Velocity of, *H. M. Parkhurst* S9:476
Lights at same time, Northern and southern, *H. Arctowski* P9:207
Light-waves applied to metrology, *A. A. Michelson* A3: 92
Limits of vision, *G. Davidson* P10:111
E. Holmes P9:499
Liquefaction of gases, *J. Dewar* P10:469, 531; P11:8, 79, 117
Liverpool address, by Edward C. Pickering S2:281
Locus of center of gravity, *T. J. J. See* A3:627

XUM

Volume and Page

Logarithmic computations, *H. A. Howe*.....S2: 45
Longitude, Determination of.....S2:31; S9:420
N. R. Pogson.....S5: 14
by moon culmination, *C. L. Doolittle*.....S4:231
from sextant observations, *S. J. Corrigan*.....S6:175
of observatory, university of Minnesota.....P15:315
and latitude of new U. S. naval observatory, *J. R. Eastman*.....A2:699
and photographic work, at Greenwich.....A2:607
time, *P. Smith*.....S2:175
Longitudes, Heliographic, *F. H. Bigelow*.....A2:821
new origin for terrestrial.....S10:269
Lowe observatory, *L. Swift*.....P3:465
Lowell expedition to the Andes, *D. Todd*.....P15:551
observatory in Mexico, *A. E. Douglass*.....P4:489
work, *A. E. Douglass*.....P2:395
W. W. Payne.....P4:163; P8:448
Lunar apsides, Motion of, *E. Colbert*.....S6:49, 82
atmosphere, *W. H. Pickering*.....P8:205
and occultation of Jupiter, *W. H. Pickering*.....A1:778
crack in Valley of Alps, *W. H. Pickering*.....P13: 64
crater and rills, Hyginus, *E. S. Holden*.....S9:119
cusps with horizon, *F. Elcharwich*.....P7: 52
cycle, *R. W. McFarland*.....P14: 27
eclipses as problems for students, *J. G. Hagen*.....S3: 46
formations, Origin of, *W. H. Pickering*.....P8:147, 181
observations by Dr. Klein, *W. H. Pickering*.....P10:118
phenomena in October, *W. H. Pickering*.....P10:419
photographs taken at Lick observatory, *R. Sprague*.....A1:348
photography.....A2:377
W. R. Brooks.....S7: 37
Lyra, Central star of Ring nebula, *J. E. Keeler*.....A1:824
Ring nebula in, *H. C. Wilson*.....P5:337
Note.....S7:42, 359
β *Lyrae*, Note on.....P10:155
Light changes of, *G. W. Myers*.....P6:268
Spectrum of, *A. Belopolski*.....A2:258
H. C. Vogel.....A3:358, 561
Visual observations of, *J. E. Keeler*.....A2:350
U *Lyrae*.....P9:518
W *Lyrae*, Period and light curve of.....P10:215
R. O'Halloran.....P15: 95
Lyrids, See Meteors.
Macpherson, H. Jr.....P15:177
Magellanic cloud, *E. C. Pickering*.....P5:411
Magne-crystallic action and the aurora, *M. A. Veeder*.....P12:182
Magnesium is a source of light.....A1:525

Volume and Page

Magnetic disturbance, *G. M. Whipple*.....A1:332
disturbances, Solar origin of, *E. W. Maunder*.....P13:59; P14:228
T. S. H. Shearman.....P13:226
P. Tacchini.....A1:436
fields surrounding the sun, *F. H. Bigelow*.....A2:706, Cor. A2:848
influence, West Indian hurricane and, *F. H. Bigelow*.....A3:441
H. A. Hazen.....A3:105, 443
perturbations of the sun-spot.....A1:330
M. Moreaux.....A1:318
Magnetic Storms—See Auroras.
Magnetic storm of February in Mauritius.....A1:525
storms, aurorae, and solar phenomena, *W. J. S. Lockyer*.....P11:552
M. A. Veeder.....A2:449
Magnitudes of the stars, Photographic, *E. C. Pickering*.....P6: 59
and visual.....A1:482
Mare Crisium, *W. W. Payne*.....P11:130
Mars, *A. E. Douglass*.....P7:113
P. Lowell.....A3:538, 645, 740, 814; P2:1, 52, 97, 154, 255, 343; P4:113
(I Introductory, P2:1, II Polar snows, P2:52; III Spring phenomena, P2:97; IV Atmosphere, P2:154; V Canals, P2:225; VI Oases, P2:343; *P. Lowell.*)
W. W. Payne.....P3:345, 385; P15:449, 539
W. H. Pickering.....A1:668, 849; P13:305
G. Schiaparelli.....A3:635, 714
as the abode of life, by *P. Lowell*.....P16:129
Atmosphere of, *W. W. Campbell*.....P3:438
P. Lowell.....P2:154
Axis of rotation.....P12:428
Calendar for, *D. A. Drew*.....P4:417
Canals of, *J. R. Holt*.....A3:347
P. Lowell.....P2:255
Observatory.....P16:520
W. W. Payne.....P12:365
are what?.....P15:579
Changes in the.....P12:281
Double, *P. Lowell*.....P5:234
W. H. Pickering.....P12:385
photographed, *P. Lowell*.....P13:479
Climate of, *M. Manson*.....P2:371
Colors exhibited by, *W. H. Pickering*.....A1:449, 545, 632
Drawings of, *W. L. Leonard*.....P15:387
get its moons? Where did, *E. Miller*.....P4:424, 499
note.....P4:573
Is aqueous vapor present on, *E. I. Yowell*.....P7:237
Meagre news from, *L. Swift*.....A1:678
Means of sharpening photographic image of, *P. Lowell*.....P15:612

XUM

Volume and Page

Mars, *(Continued)*
Micrometric measures of the diameters of, *P. Lowell*.....P3:287
Oases of, *P. Lowell*.....P2:343
Observations of A3:785
at Goodsell observatory, *H. C. Wilson*.....A1:685
Halsted observatory, *C. A. Young*.....A1:675
Lick observatory, *E. E. Barnard*.....A1:680
E. S. Holden.....A1:663
Washburn observatory, *G. C. Comstock*.....A1:679
by Phillips in 1903.....P12:212
Occultation, 1892, by the moon, *G. E. Hale*.....A1:610, 627
G. W. Hough.....A1:945
H. A. Howe.....A1:745
J. E. Keeler.....A1:831
Opposition in 1892.....A1:541; P2:430
1905-7-9, *R. Buchanan*.....P13:137
Our knowledge of, *J. Ritchie, Jr*.....S9:450
Photographs of surface of, *W. H. Pickering*.....S9:254
Physical, *Dr. Terby*.....A1:478, 555
condition of.....S9:122
Polar caps of, *P. Lowell*.....P11:369
(north), *P. Lowell*.....P4:202; P15:416
(south), *A. E. Douglass*.....A3:738
Diameters of, *E. E. Barnard*.....P2:433
Melting of, *W. H. Pickering*.....A3:308
rifts and arctic canals on, *P. Lowell*.....P10:113
snows, *P. Lowell*.....P2: 52
and non-glaciation, *J. R. Holt*.....P2: 78
Position of the axis of.....P14:190
north pole, *G. S. Jones*.....P10: 54
Projections on terminator of, *A. E. Douglass*.....P11:24
Region of Lacus Solis on, *J. M. Schaeberle*.....A3:644; P2: 72
Satellite IX of, *E. C. Pickering*.....P12:568
Satellites of, *W. W. Payne*.....S1:23; S3: 73
Nautical almanac errors in orbits of.....A3:707
Pretended early discovery of, *R. Copeland*.....A1:553
Schiaparelli's latest views on, *W. H. Pickering*.....A3:632
Seas of, *J. R. Hooper*.....P4:300
W. H. Pickering.....A3:553
Spectrum of, *W. W. Campbell*.....A3:752
Spring phenomena, *P. Lowell*.....P2: 97
Study of P11:409
Supposed signals from, *P. Lowell*.....P10:185
Surface markings on, *G. H. Lepper*.....P13:130
note P10:277
Visual, *W. H. Pickering*.....S9:369

Volume and Page

Mars, *(Continued)*
Why there are no mountains on, *T. J. J. See*....P16:255
and his canals, *H. C. Wilson*....S8: 13
Pyrois, *R. W. McFarland*....P2:238
Saturn, *E. E. Barnard*....S8:428
in conjunction, *L. G. Léon*....P12:147
"Mars," Lick review of, *A. E. Douglass*....P4:199
Martian canal development, *P. Lowell*....P13: 1
snows, *W. H. Pickering*....P13:196
and lunar canals, Studies in, *W. H. Pickering*....P12: 77
Martians? Are there possible, *G. S. Jones*....P9:234
Mass to energy, Relation of....P16:329
of universe to stellar dynamics, Relation of, *L. d'Auria*....P12: 20
Master's degree, Requirements for....P12:387
Mathematical progress in America....P13:229
symbols, Notes relating to, *H. S. Davis*....P5:402
teaching, Movements in, *D. E. Smith*....P13:205
Mathematics needed for professional astronomy, *W. W. Payne*....P15:493, 600
and astronomy, Culture value of, *W. W. Payne*....P12:585, 633
physics, Teaching....P16:589
Mechanics, General problems of celestial, *H. Seeliger*....P4:407, 475, 545
Medal awarding address, *W. de W. Abney*....A3:283
Mean time into sidereal, New method of converting....P10:276, 388
Measuring faint spectra, Method of, *W. Harkness*....S1: 52
photographic plates, New apparatus for....A2:512
Measurement of photographic intensities, *E. C. Pickering*....P8:328
Measurements of minute linear distances....P14:383
Paris observatory bureau, *D. Klumpke*....A2:783
Refinement of modern, *J. A. Brashear*....S9:204
Measures of star preceding β *Capricorni*....S5:285
Sirius, Procyon and β 395....P5:558
Medals, Laland, Royal Astronomical Society, etc. (See Awards)
Mercury, *P. Lowell*....P4:360
W. W. Payne....P7:466
Elongations of, (1905)....P13:281
Mass of, *Nature*....A3:781
note....P11:461
E. C. Pickering....P10:554
Naked eye object, *W. F. Denning*....P8:202
Physical phenomena at transit of, *M. B. Synder*....P16:390
Rotation period of....S9:167
surface undisturbed by earth tremors, *F. P. Leavenworth*....A3:597
Transit of 1661 and of 1664, of....P2:284
1882....S1: 53
1891, Observations of....S10: 40
R. B. Fulton, S10:377; Lick obs., S10:291;

Volume and Page

Mercury, *(Continued)*
Transit of 1891, *H. S. Pritchett,* S10:289; *T. D. Simonton,* S10:289; *M. B. Snyder,* S10:292; Univ. of Mo., S10:289; U. S. Naval obs., S10:289; *M. A. Veeder,* S10:291; Warner obs., S10:290; Washburn obs., S10:290.
1894, Observations, Agricultural college, S. D., A3:868; P2:188; Chabot obs., A3:868; P2:188; Davidson obs., A3:866; P2:187; Dearborn obs., P2:188; Goodsell obs., A3:869; *D. A. Hadden,* P2:233; Halsted obs., A3:868; P2:188; *H. A. Howe,* A2:88; Leander McCormick obs., A3:868; P2:188; Lowell obs., A3:865-6; P2:185; *E. S. Martin,* P2:232; Notes A3:704, 779, 866; P2:93, 168.
1907 visible in U. S., *W. F. Rigge*.....P15:488
1907 of, Observations—
Detroit obs., P16:63; Drake univ., P15:644; Flower obs., P15:643; Goodsell obs., P16:62; Harvard obs., P15:643; P16:128; Ladd obs., P15:643; *M. G. Merritt,* P16:188; *M. Moye,* P16:62; *A. G. Sivaslian,* P16:393; Syrian Protestant college, P16:128.
Visibility of, *J. H. Eadie*.....P9:462
G. S. Jones.....P9:367
Meridian circle at Cincinnati observatory, *J. G. Porter*.....S8: 3
Goodsell observatory, *W. W. Payne*.....S6:302
Division errors of, *Director Keyser*.....S3: 33
Index error of, *W. A. Rogers*.....S2:138
settings, Device for facilitating, *W. E. Cooke*.....P10:365
conference S4: 14
counterpoises, *E. S. Holden*.....S1:310
instruments, Mounting of fixed.....P11:516
line, Establishing, *G. C. Comstock*.....P9:246
observation, Constant error of, *J. G. Porter*.....P13:117
observations, How to make good, *T. H. Safford*.....S10:113, 209, 401
Merope nebulae, Drawing by E. E. Barnard of.....S1:24, 57
Meteor comets, *W. H. S. Monck*.....S8:208
explosion S10:106
paths, Maps for tracing, *T. W. Backhouse*.....S5:114
radiants S1:199; S3:236
W. F. Denning S5: 61, 167, 309; S6:160, 287, 356; S7:447; S9: 438; S10:234, 295; A3:600, 872.
W. H. S. Monck S9:363, 454; S10:109, 126, 295, 300; A3:334, 782.
W. W. Payne, Chart of.....P7:337
streams, Comet, *S. J. Corrigan*.....S5:145

Volume and Page

Meteor, *(Continued)*
trail, Photograph of Leonid P10:497
seen at Grahamstown, 1895, *L. A. Eddie* P3:271
train, *W. R. Brooks* S3:167
trains drifting, *E. E. Barnard* S1:174; S10:426
Meteors, Celestial phenomena explicable by, *W. H. S. Monck* S9:260
Double, *L. Swift* S1:108
Heights of, *W. F. Denning* S8:299
Leonid, *W. H. Pickering* P12:530
Leonids, Balloon observations of P11:220
Case of the, *J. B. Wood* P10:459
Importance of accurately observing, *G. J. Stoney* P4:134
Orbit of the, *W. W. Payne* P8:523
Period of revolution of, *W. H. Pickering* P10: 8
Perturbations of, *G. J. Stoney* and *A. M. W. Downing* P7:227
Shower of, *H. C. Wilson* P6:568
Non-appearance of, *W. H. Pickering* P7:523
stream, Ephemerides of two situations in, *G. J. Stoney* and *A. M. W. Downing* P7:403
Observed: S2:148; S5:317; S9:41; P14:251; *H. W. Griggs*, P14:571; *E. F. Loomis*, P16:394; *E. L. Moseley*, P12:190; *R. O'Halloran*, P3:213; *A. A. Veblen*, P16:128; *A. S. Young*, P16: 587.
Andromeda, 1899, P8:50; *G. Davidson*, 1892, A2:86; *R. M. Dole*, P8:51.
Aquarid, 1902 ..... P10:498
Bielid, 1885, *E. E. Barnard*, S5:74; *J. H. Eadie*, S5:26; *W. W. Payne*, S5:11; *C. A. Young*, S5:23.
1892, *E. E. Barnard* A1:943
1899, *G. W. Meyers*, P8:13; *C. A. Young* P7:542
Draconid, 1907, *W. F. Denning* P16:198
Leonid, 1882 ..... S1:237
1896, *A. S. Young* P4:498
1898, *C. D. Perrine*, P6:553; *E. C. Pickering*..P6:309; P7: 46
1899, *W. W. Payne*, P7:393, 475, 524; P8:15; *E. C. Pickering*, P7:412; *W. H. Pickering*, P7:395.
in India, *M. E. Moulton* P8:104
New York P8: 52
Park college, *F. P. Brackett* P8:163
1898-1900, *J. K. Rees* P9: 79
1900, *E. M. Bardwell*, P7:49; *F. P. Brackett*, P7:30; P8: 569; *W. A. Cogshall*, P7:71; *E. N. Fought*, P7:50; *P. W. Jenkins*, P7:47; *F. E. Millis*, P7:47; *W. C. Mills*, P7:101; *W. E. Sperra*, P7:101; *L. G. Weld*, P7:17; Vassar college, P8:566.
1901, *W. C. Brenke*, P10:105; Ia. Wes. Univ., P10:164;

XUM

Volume and Page

Meteors observed, *(Continued)*
Leonid, 1901, *E. L. Larkin,* P10:16; *W. W. Payne,* P10:559; Pomona college, P10:165; *J. K. Rees,* P10:107; *R. B. Taber,* P10:403; Univ. Lawrence, P10:220; Univ. Minnesota, P10:161.
1902, *R. M. Dole,* P10:50; Ladd obs., P10:48; *L. G. Léon,* P11:53; *W. H. Pickering,* P10:400; P11:6; *W. P. Russell,* P10:53; *J. Salloms,* P10:51; *F. E. Seagrave,* P10:54.
1903, Leander McCormick obs., P11:581; Univ. Ill., P11:582; *W. Upton,* P12:67; Yerkes obs., P11:580.
1904, Brown univ., P13:54; Drake univ., P13:54; Harvard, P13:56; Ill. univ., P13:55; Mt. Holyoke college, P12:683.
1906, *C. P. Olivier* P15: 59
Lyrid, 1882 ..... S1: 99
1900, *R. M. Dole* P8:348
1907, *W. F. Denning* P15:168
Orionid, 1900, *R. M. Dole* P8:520
1901, *R. M. Dole* P10: 50
1904, *C. P. Olivier* P12:680
Perseid, 1882, *D. Kirkwood* S1:141
1899, *J. A. Miller* P7:406
1891, *E. E. Barnard* S10:470
1901, *R. M. Dole,* P9:523; *D. Kirkwood,* P9:413; *W. M. Mitchell,* P9:522; *C. P. Olivier,* P9:525.
1902, *R. M. Dole,* P10:499; *C. P. Olivier* P10:555
1904, *R. M. Dole* P13:347
Orbits of, *W. H. S. Monck* S10:328
O. C. Wendell S4:55; S7: 47
Patches of, *W. F. Denning* P10:121
Perseid and Lyrid, *R. M. Dole* P11:514
Photographing, *W. L. Elkin* A3:626; P2: 17
Photographs determining parallax of, *J. M. Schaeberle* and *A. L. Colton* P5:232
velocity of, *W. L. Elkin* P7:441
Photography of, *E. E. Barnard* P5:281
Telescopic, *W. F. Denning* P15:170
J. H. Metcalf P15:29; P16:588
ζ Ursids, *R. M. Dole* P8:346
and meteorites, *W. H. S. Monck* S8:395
stellar scintillation, *I. E. Christian* P1:414
Meteoric astronomy, *D. Kirkwood* A2:385, 789; A3:188
orbits and radiants, *S. J. Corrigan* S5:100
phenomena, *E. F. Sawyer* S1:91, 150
showers, Cometary, *W. F. Denning* S5:106

Volume and Page

Meteoric showers, *(Continued)*
W. F. Denning.....P13:107
notes on.....S4:299; S9:141
1897, *W. H. Pickering*.....P6:294, 326
1898, *H. C. Wilson*.....P6:502
1903, at Leander McCormick observatory.....P11:512
Meteorite, *E. S. Martin*.....A3:172
Meteorites.....S9:40, 137, 283
meteors, and shooting stars, *H. A. Newton*.....S6:65, 98, 127
Mexican.....A1:351; P10:558
Note on brilliant, *N. H. Winchell*.....P12:553
or aerolites, *W. H. S. Monck*.....P11:357; Cor. P11:522
Pennsylvania, *J. W. Miles*.....P16:458
Probable origin of, *G. W. Coakley*.....A1:753
Meteorology on Pacific Slope, *J. S. Ricard*.....P16: 92
Meter and wave-length of cadmium light compared, *A. A. Michelson*....A2:556
Metrological society, American, *J. K. Rees*.....S9:335
Metrology at Northwestern university.....S7:398
Micrometer, Bright-wire illumination for, *S. W. Burnham*.....S1:110
for measuring astro-photographic plates, *W. H. M. Christie*.....A2:588
Handy, *N. M. Mann*.....S3: 10
Illumination for a position, *G. W. Hough*.....S9:161
observations of comets Faby and Barnard, *C. L. Doolittle*.....S5:256
screw, Brass.....S6:229
value of one revolution of, *G. C. Comstock*.....S7:343; Cor. S7:409
Value of filar, *C. B. Hill*.....S7:311
Migrating birds, Determining heights of, *J. Stebbins*.....P14: 65
Mile, English, *J. M. Clark*.....S9:155
Milky Way in autumn heavens, *R. O'Halloran*.....P10:372
Best method of observing, *A. Pannekoek*.....P5:524
Boeddicker's Drawings of the.....S8:468; A1:538
Charts for inserting, *A. Pannekoek*.....P5:485
Necessity of further reseaches on, *A. Pannekoek*.....P5:395
Photographing, *E. S. Holden*.....S8:424
H. C. Wilson.....P3: 58
and theory of gases, *H. Poincaré*.....P14:475
Minor planets, (See Asteroids)
Facts about, *J. K. Rees*.....P6:339
Photographic observations of, *M. Wolf*.....A2:109, 779
and short period comets compared, *M. O. Callandreau*.....P12:117
their names.....P11:546
Mira, *o Ceti*, (See Variable Stars, Cetus)
Mira and W *Lyrae*, Light curves of, *R. O'Halloran*.....P15: 95
Mirage, *C. M. Charroppin*.....P5: 23
"Mirage" from blast furnaces, *L. D. Hayes*.....P16:321
Mirage, Night, *W. E. Sperra*.....P16:164

XUM

Volume and Page

Mirror for reflecting telescopes, *F. L. O. Wadsworth*.....P5:518
solar observatory, 100-inch, *G. E. Hale*.....P14:557
Mirrors, Aberration of parabolic, *J. M. Schaeberle*.....P6: 38
Miscellany, *R. W. McFarland*.....P13:531
Mitchel, O. M., "Old Stars," *O. E. Harmon*.....P5:413
Monoceros, Nebula in, *E. E. Barnard*.....S4:313; A3:642
Moon, *A. Marth*.....S1:208
W. W. Payne.....P1:16, 45, 289; P2:67; P3:176; P4:143, 242
Atlas of, Mm. Loewy and Puiseux, *W. W. Payne*.....P11: 25
L. Weinek.....P5:240
Bright rays of the, *H. G. Tomkins*.....P15:296
streaks from craters of.....S9:281
Change in crater Pliny.....S8:376
Color of eclipsed, *J. E. Keeler*.....S4:311
Formations of the, *W. H. Pickering*.....P10: 57
Gigantic artificial, *Scientific American*.....P7:107
Harvest, *E. A. Bowen*.....P1: 32
hoax, *S. A. Mitchell*.....P8:256
Map by J. A. Colas of.....A3:787
Motion of the, *Nature*.....P14:140
observations in Mexico, *L. G. Léon*.....P11:276
Place of origin, *W. H. Pickering*.....P15:274
in Praesepe, Occultation of, *A. R. J. F. Hassard*.....P16:328
Rills on the, *P. Fauth*.....P15:490
Temperature of.....S4:310
Theory of surface markings of, *E. Miller*.....P3:273, 383
Wet and dry, *A. K. Bartlett*.....P9:442
and thunderstorms, *A. B. MacDowall*.....P10:222
F. E. Seagrave.....P10:332
weather, *A. K. Bartlett*.....P10:368
W. H. Pickering.....P11:327
wet days.....P9:464
Moon's auroral glow, *J. Haywood*.....S3:121
heat, Distribution of.....S10:471; A1:347
motion, Theory of.....S10: 47
secular acceleration, *I. E. Christian*.....P7:329
synchronous rotations, unexplained, *R. M. McCreary*.....P4:575
Moonrise, Time of, *W. F. Rigge*.....P13:550
Motion of atmosphere at high elevation, *L. Swift*.....S9:472
a heavenly body in resisting medium, *G. A. Bliss*.....P6: 20
pole, Latest knowledge of, *S. C. Chandler*.....P6:509
stars in line of sight, *E. C. Pickering*.....S2:79; P4:306
Motions, Commensurability of, *A. Hall*.....S4:200
D. Kirkwood.....S4:257
of Jupiter, Saturn and minor planets, Relation between, *D. Kirkwood* A2:302
stars, Potsdam measures of.....A2:271

XUM

Volume and Page

Mound-builders' calendars P2:429
Mount Lowe railway observatory, *E. L. Larkin* P9:360
Mounting telescope at Amherst? New system of, *S. B. Elliott* P10:463
telescopes, Perfection of, *E. Doolittle* P7:149
Multiplication result, *A. Hall* P9: 31
Nautical almanac office investigation A2:664, 760; A3:413
Navigation, My first lessons in, *T. Lindsay* P5:126
Nebula at M 57, *E. von Gothard* A3:190
Messier 76, Miniature Dumb-Bell P11:110
discovered by E. E. Barnard S1:135
BD + 41°4004, Parallax of Webb's planetary A2:857
G.C. 4333, *F. P. Leavenworth* S6:293
4415, Error in Klein's atlas S8:137
HV 15 = NGC 6960, Photograph of, *H. C. Wilson* P10:432
surrounding, Nova *Persei*, Motion in, *C. D. Perrine* P10: 9
Suspected proper motion of, *L. Swift* S5: 60
Nebulae, *L. Swift* S4:1; P10:160
Burnham's measures of planetary A1:174
Corrections of catalogues, *F. Muller* S7: 44
Curious and difficult, *L. Swift* S4:174
Discoveries at Lowe observatory, *L. Swift* A1:197; P5:426; P6:18, 400
Motions of planetary S9:403
New S3:57, 184; S4:53; S5:25; S6:83; S8:38; S10:240; A1:247, 523, 751; A2:189; P7:223.
by photography, Annals H.C.O. P9:431
and old, *L. Swift* A1:566
News from, *C. A. Young* S9: 27
observations, *F. Muller* S6:361
Photographs of, *A. A. Common* S8: 25
by photography, Discovery and cataloguing small P9:468
Planetary, *E. C. Pickering* S1:139
Spectra of, (Magnesia fluting) *G. E. Hale* S10: 23
J. E. Keeler S10:264
and new star, *E. von Gothard* A2: 51
Wonderful, *L. Swift* P1:249
and clusters, *L. Swift* P1:369
comet seeking, *L. Swift* P1: 30
nebulous stars P7:223
Nebular hypothesis, *J. E. Keeler* A1:567, 768
Prof. Chamberlin on, *F. R. Moulton* P5:508
of La Place, *G. W. Coakley* S7:132, 191
Nebulosities and clusters in Milky Way, Photographic, *E. E. Barnard* A3:177
of the *Pleiades* exterior, *E. E. Barnard* A3:768
Observatory P7:109
H. C. Wilson P7: 57
Nebulous areas of the sky, *H. C. Wilson* P12:401

XUM

Volume and Page

Nebulous, *(Continued)*
ring, *L. Swift*.....S9: 47
Negative enlargements, *W. Zimmerman*.....P13:484, 556
Neptune, the planet, *E. Holmes*.....P16: 9
in 1845-6, Search for, *E. S. Holden*.....A1:287
Satellite of, *F. Tisserand*.....A3:291
satellites, Measures of.....P6:255
Neptune's position originally computed, *W. H. Pickering*.....P14:525
New light from old records, *K. Laves*.....P14:276
Newspaper astronomy, *R. M. McCreary*.....P6:103
Newton, Sir Isaac, Eulogy on, *E. Halley*.....P12:504, 571
N. Y. observatory and nautical museum, *W. W. Payne*....P14:349, 380; P15:188
Night clouds, Request for observations of, *W. Foerster* and *O. Jesse*.....A1:859
Non-Euclidean geometry, *G. B. Halsted* P7:482, 519; P8:8, 189, 267; P9: 555; P10:26, 176.
W. H. S. Monck.....P8:333
and astronomy, *W. H. S. Monck*.....P9:370
Noon mark, Easy way to make, *E. Riggs*.....P2: 73
Normae, Nova, *E. C. Pickering*.....A3:40, 398
Observations of, *W. W. Campbell*.....A3:311
Numerical calculation, Art of, *F. H. Seares*.....P16:349
Obituary Notices—
Allen, Richard Hinckley, *H. S. Davis*.....P16:189
Argelander, *A. Krueger*.....S2:197, 229, 276
Bruce, Catherine Wolf, *W. W. Payne*.....P8:235
Callandreau, M. O., *Nature*.....P12:288
Clark, Alvan, *W. W. Payne*.....S6:250
Clark, A. G.....P5:167
Clark, G. B., *J. A. Brashear*.....A1:367
Clerke, Agnes M., *H. Macpherson, Jr*.....P15:165
T. J. J. See.....P15:323
Common, Dr. A. A., *H. H. Turner*.....P11:367
Copeland, Ralph, *H. Macpherson, Jr*.....P14: 1
De la Rue, W.....S8:281
Ennis, Jacob.....S9:1, 185
Flanery, David, *P. S. Yendell*.....P8:400, 484
Gould, Benjamin Apthorp, *S. C. Chandler*.....P4:341, 387
A. Hall.....P4:337
Grant, R., *R. Copeland*.....A1:878
Hall, Asaph, *H. S. Pritchett*.....P16: 67
Harkness, William, *F. H. Bigelow*.....P11:281
Henry, Prosper, *O. Callandreau*.....P11:558
Houzeau, J. C.....S7:358
Israel, Edward, *M. W. Harrington*.....S4: 83
Janssen, P. J. C., *H. Macpherson, Jr*.....P16: 72

Volume and Page

Obituary notices *(Continued)*
Keeler, James E., *J. A. Brashear* P8:476
C. D. Perrine P8:409
Knapp, M. W A1:254
Kowalevski, Sophie, *C. C. Barnum* A1:281
Krueger, C. N. A., *Observatory* P4: 54
Langley, Samuel P., *J. A. Brashear* P14:257
Lawton, G. K., *T. J. J. See* P9:374
Loewy, Maurice, *Bulletin Astronomique* P16: 1
Loomis, Elias, *H. A. Newton* S9:241
Lyman, C. S S9:142, 400
Mitchel, Maria, *M. W. Whitney* S9: 49
Mitchel, O. M., *J. G. Porter* S8:442
Newton, H. A., *N. Y. Evening Post* P4:236
Parkhurst, Henry M., *J. A. Parkhurst* P16:231
Perry, S. J., *C. M. Charroppin* S9:197
Peters, C. H. F., *J. G. Porter* S9:439
Pritchard, Charles, *W. E. Plummer* A2:592
Proctor, Richard A., *C. R. Willard* P1:319
Rees, John Krom, *H. Jacoby* P16:639
Roberts, Isaac, *W. S. Franks* P12:469
Rockwell, Charles Henry, *W. W. Payne* P12:262
Rosse, Earl of, *W. W. Payne* P16:570
Rutherfurd, L. M A1:617
J. K. Rees A1:689
Scammon, J. Y S9:188
Schimpff, R. D S8: 91
Schoenfeld, E., *A. Krueger* S10:275
Simonton, Thomas D., *S. J. Corrigan* P16:466
Smyth, C. Piazzi, *R. Copeland* P8:384
Struve, O. W., *M. Nyrén* P14:352
Tacchini, Pietro, *H. Macpherson, Jr* P13:306
Tempel, W., *G. V. Schiaparelli* S8:238, 257
Trepied, M. C., *M. Loewy* P15:519
Vogel, H. C., *H. Macpherson, Jr* P15:453
von Oppolzer, Theodor, *Monthly Notices* S6:188
Watson, J. C., *G. C. Comstock* S7:273
Winlock, Anna, *M. E. Byrd* P12:254
Winlock, W. C., *S. P. Langley* P4:351
Wolf, Rudolf, *Observatory* A3:112
Young, Charles Augustus, *J. M. Poor* P16:218
Object-glass grating, *L. E. Jewell* A3:44, 155
New triple achromatic, *H. D. Taylor* A3:696
Note A3:400
struck by lightning P2:286
Object-glasses, Care and cleaning, *J. A. Brashear* P2: 9

XUM

Volume and Page

Object-glasses, *(Continued)*
for two lenses, *A. Steinheil*.....S3:225
Putting in place and adjusting, *J. A. Brashear*.....P2: 57
Objective may lose figure.....P16:256
Construction of telescope, *C. S. Hastings*.....S1:244; S2: 39
prism, *E. C. Pickering*.....A1:199
Obliteration data corrected by least squares, *H. Whitaker*.....S9:458
from illumination, *H. M. Parkhurst*.....S7:337
Observations, Abbott's latitude and longitude, *E. S. Holden*.....S1: 64
at Mount Whitney, *S. P. Langley*.....S1:131
for beginners, *W. W. Payne*.....P3:14, 121
of Chabot observatory.....S6:290
Rejection of discordant, *A. Hall*.....S6:297
Sudden Phenomena, *S. P. Langley*.....S8:291
(For specific observations, see subject)
Observatories, Ancient and modern, *W. Upton*.....S10:481
Free public, *W. W. Payne*.....A3:110
Mountain, *E. C. Pickering*.....S2:105
New, at Edinburgh.....A2:761
Manila.....A2:763
of Scotland, *H. Macpherson, Jr*.....P15: 65
United States.....S1: 8
Popular fallacies about, *M.E.Byrd*.....S5:263
work in foreign.....S3:129; S4:8, 212
and observers, *C. L. Doolittle*.....P11:467
Observatory at Amherst.....P10:390
Beloit.....S1: 24
Instruments for.....S1: 69
Cape of Good Hope, *H. Jacoby*.....P3:217
Chamberlin.....S10:400
Cincinnati, *O. Stone*.....S1: 56
Instruction for students at.....S1: 23
Meridian circle at.....S9: 46
Dartmouth.....S1: 24
Dearborn, *G. W. Hough*.....S8:341
H. A. Johnson.....S7:381
Dudley, Rebuilding of.....A1:630
Goodsell, *W. W. Payne*.....S7:321
Greenwich, Work at, *Monthly Notices*.....S2: 74
Heidelberg.....A3:586
Iowa State University, *L. G. Weld*.....S10:474
Jeypore, India, *W. W. Payne*.....P11:542
Kenwood physical, *G. E. Hale*.....S10:321
Dedicatory address, *C. A. Young*.....S10:312
Ladd, *W. Upton*.....S10:502
Dedicatory address at, *W. A. Rogers*.....S10:491

XUM

Volume and Page

Observatory, *(Continued)*
La Plata, *Bulletin Astronomique*.....S3:116
Leander McCormick.....S1: 98
Lick.....S4:46; A1:628
E. S. Holden.....S5:225; S7: 49
Meridian circle, *G. C. Comstock*.....S1: 65
Work at, *E. S. Holden*.....S1:133; S3:301
Litchfield, endowed.....S4:202
Manila, Telescope for, *J. Algué*.....A3: 85
McKim, *W. V. Brown*.....S4:305
Mississippi university, *R. B. Fulton*.....S10:382
National Argentine, *J. M. Thome*.....A3: 8
Paris, Elbow equatorial for.....S10:295
Photographic meridian telescope for.....P16:193
Reflector remodelled for photographic work.....A2:173
Princeton university, Construction of large telescope.....S1: 22
Sydney.....S10:523
Tashkent.....S1:134
Underwood, *M. D. Ewell*.....S10:519
United States Naval.....S1:61; A1:630
R. Copeland.....S3:270
Washburn, *H. S. Pritchett*.....S1:126
Windsor, *E. L. Larkin*.....S1:132
Yale university, Horological bureau of.....S1: 22
Yerkes, *G. E. Hale*.....A1:790
An amateur's, *J. H. Metcalf*.....P14:211
Dual, *J. D. Parker*.....P14: 96
First college in U. S. to have, *J. L. Love*.....S7:417
Latitude of Ann Arbor.....S8:334
Detroit.....S8:285
Lick.....S5:302
Local patronage for, *W. W. Payne*.....S9:65, 113, 139, 231
threatened.....S8:452
Locations, Expeditions for ascertaining, *P. Lowell*.....P11:144
Longitude at Goodsell.....S8:474
Mountain station, *W. H. Pickering*.....A1:353
"National" vs. "Naval," *L. Boss*.....S10:161
Need of free astronomical, *F. Armitage*.....P1:273
Novel, *C. F. Harms*.....P12: 73
publications of U. S., listed, *H. O. Severance*.....P15:517; Cor. P16:126
and reports, (See Reviews)
Observer, Requisites for transit, *G. A. Hill*.....P13:362
Observing seat for equatorial, *G. W. Hough*.....S1: 47
Occultation phenomena, *T. Lindsay*.....P6:524
Occultations, *J. Morrison*.....P5:417
Method of computing, *C. L. Woodside*.....S5:203

XUM

Volume and Page

Occultations, *(Continued)*
of stars by the moon, *G. W. Hough*.....P5:451
star clusters, Graphical computation of, *W. E. Sperra*.....P6: 76
Oceans, Stability of equilibrium, *T. J. J. See*.....P3:178
70 *Ophiuchi, S. W. Burnham*.....A2:585
J. E. Gore.....S10: 45
Discovery of triple, star.....P3:268
F 70 *Ophiuchi*, Discovery of unseen body, *E. Doolittle*.....P3:329
70 *ρ Ophiuchi*.....P14:507
70 *ρ Ophiuchi* Nebula and smallness of ground-work stars, *E. E. Barnard* P5:227
τ Ophiuchi, Orbit of, *S. W. Burnham*.....P4:347
U *Ophiuchi*, New elements.....P11:453
Optical illusion, Curious, *A. K. Bartlett*.....P12:123
Orbit of a body approaching the sun, *G. W. Coakley*.....S10:305
bodies under action of central attraction, *R. W. Wood*.....P8: 32
Graphical method for elements for parabolic, *F. R. Moulton*.....P7:193
Orbits,—See name of body.
Computation of meteoric, *S. J. Corrigan*.....S5: 33
parabolic S1:217, 247
Determination of, *A. Hall*.....P13:353
from 3 observations, *A. O. Leuschner*.....P13:296
of Meteors, *O. C. Wendell*.....S5:111
Orbital motion of sun and stars, *E. B. Whitmore*.....S8:332
Orientation of field of view of telescope, *E. T. Whitelow*.....P15: 22
Orion, Burnham on the Trapezium of.....S8:268
Great, photographic nebula of, *E. E. Barnard*.....A3:811; P2:151
W. H. Pickering.....S9: 1
L. Swift P1:157
H. C. Wilson.....P1:433
Note S8:225
Red fringe to the.....A3:504
Spectrum of, *W. W. Campbell*.....A2:927; A3:384
E. S. Holden.....S1:66, 104
Mr. and Mrs. Huggins.....S9:303
Summary of monograph of, *E. S. Holden*.....S2: 77
Variable stars in, *E. C. Pickering*.....P12:332
nebulous system visible in small telescope, *C. C. Hutchins*.....S10:204
New star in Trapezium of.....S7: 88
Night with, *W. Noble*.....P4:428
Orionids,—See Meteors.
α Orionis, Variability of.....P11: 51
β Orionis (= *β* 555), Companion to, *R. G. Aitken*.....P6:585
θ Orionis S7:217
U *Orionis*, Light curve of.....P12:143
U *Orionis*, Observation of, *F. E. Seagrave*.....P12:145
Orthographic projection of the sphere, Problem, *W. F. Rigge*.....P14:402

Volume and Page

Oscillations of solar activity and climate P13:576
Oval and ellipse, Eight-centered, *F. R. Honey* P16:617
Pair of ancients, *C. C. Hutchins* S10:214
Palissa, Discoveries of asteroids S1:23, 63, 71; S2:31, 92; S3:153, 181, 223; S5:151, 318; S6:231, 328; S7:169, 260; S9:182, 469.
Parabolic mirrors, Corrections and testing of, *F. L. O. Wadsworth* P10:337
Parallax, Aberration and solar, *A. Hall* S2:165
of *μ Cephei* by Ball S1: 67
first magnitude stars, *W. L. Elkin* S7:395
Lesson in, *O. E. Harmon* P1:403
of *α Lyrae* and 61 *Cygni* S2:1; S5:311
of O Arg. 14320, *F. P. Leavenworth* A2:206
by photography, Stellar, *C. Pritchard* S7:173
Pearsons, Dr. D. K., *W. W. Payne* P12:345
37 *Pegasi*, Orbit of, *S. W. Burnham* A2:678
U Pegasi, Variable star 8598, *P. S. Yendell* P3:400
E. C. Pickering P6: 29
Peirce to American mathematics and astronomy, Services of, *T. J. J. See* P3: 49
Pendulum escapement, *Mr. Leman* A2:882
Persei, Nova, Antonadi, P9:459; *W. C. Brenke*, P9:357; *M. Brooks*, P9:283; *A. E. Douglass*, P9:263; *C. Flammarion*, P9:459; *D. E. Hadden*, P9:282, 355, *G. E. Hale*, P9:264; *G. L. Jones*, P9:573; Ladd obs., P9:220; *R. O'Halloran*, P9:354; *C. P. Olivier*, P10:56, 274; *E. C. Pickering*, P9:184; Pomona college, P9:221; *F. E. Seagrave*, P9:217, 283, 519; P10:47, 158; P11:224, 344; P12:358; Univ. Va., P9:356; Whitin obs., P9:220; *M. W. Whitney*, P9:574-5; *M. Wolf*, P9:459; *H. C. Wilson*, P9:197; P10:74, 158, 331; *A. S. Young*, P9:357; Yerkes obs., P9:218.
Brightness of, *H. C. Wilson* P9:409
Chart and catalogue for, *J. G. Hagen* P9:191, 279
Color variation of P10: 47
Comparison stars for P10:274
Light curve of, *H. C. Wilson* ... P9:447, 479, 545; P10:31, 91, 144, 199, 257, 316.
Measures of P10:384
Motion of nebulae near, *J. C. Kapteyn* P10:124
Nebulosity of P10: 48
Proper moiton and parallax of P10:330
Spectrum of, *L. Becker* P12:603
and brightness of P16:388
Triangulum and Hydrae, Novae, *M. Fleming* S10: 7
20 *Persei* (β 524), *S. W. Burnham* A2:404

XUM

Volume and Page

20 *Persei* (β 524), *(Continued)*
S. Glasenapp A2:499
U *Persei*, a comparison star for *Eros* P10:378
No. 2 Nova, *E. C. Pickering* P9:282; P10:546
F. E. Seagrave P9:283
Perseids,—See Meteors.
Personal equation machine, *W. W. Payne* S10:139
Perth observatory meridian work, *W. E. Cooke* P15:499
Perturbations of the heavenly bodies, *F. R. Moulton* P6: 88
and the perturbative functions, *J. Morrison* P8:309; P9:130, 249, 436
Peters' celestial charts, *B. D. Gilbert* S1:288
observations treated by Chandler, *F. Folie* A2:874
Peters-Borst star catalogue S8:138, 455; A3:417; P1:428
Phenomenon, Remarkable, *F. Campbell* P11:484
Suggested explanation, *M. A. Veeder* P11:486
Philippine firmament, *R. O'Halloran* P7:201
Phoebe in May and June, 1906, *E. C. Pickering* P14:506
Phoenix, Explanation of the Egyptian, *T. J. J. See* A1:457
Photo-electric cells, *G. M. Minchin* A1:702
effect of starlight, *S. M. Dixon* A1:844
W. H. S. Monck A1:843
Photographic chart of the sky, *W. F. Denning* P5: 62
H. Jacoby A2:117; P4: 53
— *Mouchez* S7:451
Observatory A3: 20
W. W. Payne P12:651
H. H. Turner P11:433
H. C. Wilson S8:379; A1:632; A3:260
Notes, S8:284; S9:378, 428; S10:378; P4: 45; P16:129.
committee, Work of, *Observatory* S8:412
conference report, *S. J. Brown* P8:355
enlargement lens, *S. W. Burnham* A1:558
halation and its remedy A1:236
lens, Hastings-Brashear P10: 55
work at Columbia observatory, *H. Jacoby* P3:211
Harvard, *E. C. Pickering* S9:328
and photometric stellar magnitudes A1:437
Photographing with a non-photographic telescope, *E. E. Barnard* S10:331
sky, Preparations for, *H. C. Wilson* S7:91, 263
Photographs, Long exposure P9:413
Photography applied to astronomical research, *E. E. Barnard* P6:425
H. H. Turner P13:72, 122
Camera for celestial, *S. W. Burnham* S10:325
Depth of definition in P14:184
high altitude, Celestial, *H. C. Wilson* P12:509

Volume and Page

Photography, *(Continued)*
Making of, *C. F. Himes*.....P8: 26
of colors A1:524
of heavens, *G. Boccardi*.....P12:521
and invisible solar prominences, *G. E. Hale*.....S10:257
and meridian observations, *T. H. Safford*.....S9:193
Photometer for determining star magnitudes, *W. E. Wilson*.....A1:307
meridian measurements S10: 46
Wedge, *E. C. Pickering*.....S1:105
(Compound), *E. J. Spitta*.....S9:163
Photometers, Polarizing, *E. C. Pickering*.....P6: 60
Photometric measurements in Palissa charts.....S4:133
observations criticized by Dr. Chandler, Harvard.....A3:399
Photometry, Catalogues of meridian.....S4:163
Harvard and Oxford, *W. H. S. Monck*.....S7: 92
Revised (note) P12:282
Instrumental, *H. M. Parkhurst*.....S5:230
Photographic, *E. S. Holden*.....S9:121
Stellar, *H. M. Parkhurst*.....S4:273
Physical science, Recent advances in, *W. Crookes*.....P6:493
Piazzi stars, Nomenclature of, *H. S. Davis*.....P13:423
o Piscium, Occultation of, *H. A. Howe*.....A2: 89
Planet beyond Neptune, Photographic search for, *I. Roberts*.....A1:554
launching, *T. C. Ryan*.....P16: 17
tables, Using Newcomb's, *R. Buchanan*.....P15:133
T. G., The new, *A. C. D. Crommelin*.....P14:472
Planet's anomaly and radius vector, *K. Laves*.....P16:189
F. Rust P16: 36
rotation and revolution times, *G. W. Coakley*.....S10:217
satellites, Determinations of dimensions of, *E. E. Barnard*.....P5:285
Planets, Dimensions of small, *D. Todd*.....A2:313
Early conjunction of, *W. H. S. Monck*.....P8:238
Elements of (488), (490), (492), (494).....P11:452
Equinoxes of, *R. Buchanan*.....P13:282
Gravity on surface of, *R. W. McFarland*.....S2:150
inhabited? Are other, *R. Challice*.....P11:417
R. W. McFarland.....S2:217
D. G. Parker.....P10:357
D. E. Wing.....P11:536
Mean motions of the, *S. Newcomb*.....S3:280
Motions of, *F. R. Moulton*.....P11:284
Photometric observations of the, *E. B. Frost*.....A2:619
Semi-diameter of the, *R. Buchanan*.....P13:209
Spheres of activity of, *A. Hall*.....P7:180
F. R. Moulton.....P7:281
Stability of nebulous, *D. Kirkwood*.....S4: 65

XUM

Volume and Page

Planets, *(Continued)*
Visual brilliancy of, *R. Buchanan*....P13:175
and cyclones, *W. W. Payne*....S3:104
Planetary bodies, Law of density of....S8:471
detail, Study of, *T. J. J. See*....P4:550
Kind of eye needed for detection of, *P. Lowell*....P13: 92
observation, *W. F. Denning* P11: 19
photography with reflecting telescope, *J. M. Schaeberle*....P3:280
work at Lowell observatory, *A. E. Douglass*....P7: 74
Planetoid DQ (433) 1898, See *Eros.*
Planetoids,—See Asteroids.
discovered by Palissa,—See Palissa.
Photography of, *E. S. Holden*....P3:343
Plates by bathing, Non-screen orthochromatic and panchromatic, *E. König* P15:620
Platinum-on-glass mirrors, *C. C. Hutchins*....A3:858
Pleiades. W. W. Payne....P1:456
Number of stars in the, *E. S. Holden*....S3:117
Occultation, 1894....P2:236, 334
H. C. Wilson....P2:176
Stars of, *H. M. Paul*....S3:161
Yale measurement of, *A. M. Clerke*....S6:254
and two asteroids photographed, *H. C. Wilson*....A3:192; P1:322
Plummet bead, Path of shadow of, *E. Hayes*....P16:279
Plus probans quam necesse est, *A. Hall*....P7: 13
Polar inversion of the planets and satellites, *W. H. Pickering*....A2:692
motion, 1891-2, Six years' cycle, *H. Kimura*....P12:270
Polaris and companion, *J. H. Eadie*....S9:427
observations P7:443
Polarization of undiffracted ultra-red radiations, *C. A. Perkins*....A2:847
Polarized reflections in Nicol's prisms, *E. J. Spitta*....S9:266
Pole of the earth on its surface, Motion of north, *W. W. Payne*....P14:513
Pope and the comet, *W. F. Rigge*....P16:481, 656
Popocatepetl, Ascent of, *A. E. Douglass*....P5:505
Position angle observations, *F. P. Leavenworth*....S10:116
Positions determined near plate borders, *S. C. Chandler*....P7:286
Positive photography with reference to eclipse work, *F. E. Nipher*....P9: 24
Potsdam measures for the astrographic chart....P7:389
Precession, Auxiliary quantities....A3:87; P3:437
Constant of S1:267; S3: 92
and Assyriological discoveries, *Observatory*....P12:426
Prediction of fine seeing, *D. P. Todd*....S5:113
Pressure of light, Astronomical consequences, *J. H. Poynting*....P15:626
Principia, Second centennial of....S6:217
Prizes, Astronomical Journal, etc.—See Awards.
Probability, Theory of, *T. Lindsay*....P4:240

Volume and Page

Procyon, Variable proper motion of, *S. W. Burnham*....A3:434
Prominence, Solar, *J. B. Coit*....P12:455
H. Deslandres....A1:502
Prominences, by E. E. Read, Jr., Observations of eruptive....A1:335
1891, note....A1:240
1892, *J. Evershed, Jr*....A2:365
J. Fenyi....A1:609
1894, *D. E. Hadden*....P2: 45
Hypothesis regarding nature of, *H. C. Wilson*....P10:501
and faculae, April 16, 1893, *G. E. Hale*....A2:450
and reversal of D lines, *W. E. Woods*....A3:159
Pronunciation of star names....P5:111
Proper motion of the stars, *W. H. S. Monck*....A1:874
as criterion of distance, *J. G. Porter*....P6:549
and spectra of stars, *W. H. S. Monck*....A2: 8
motions, Table of....S4:183
Protuberance, Brilliant solar, *D. E. Hadden*....P4:335
Protuberances, Two great, *J. Fenyi*....A3:122
of August, 1905....P15:314
Publications and reports:—
Astrographic observatory....P9:462; P16:391
Astronomical society of the Pacific....S9:429
Athens observatory....
Berlin observatory....A2:281
B. A. A....P12:681; P15:318
Cambridge observatory....P14:126
Cape of Good Hope observatory....P8:290; P9:411
Cincinnati observatory....S7:120; A2: 91
Cordoba observatory....S10: 46
Dearborn observatory....S1:168
D'Abbadia observatory....P15:125
Dominion observatory....P16:195
Edinburgh observatory....P15:187
Greenwich observatory....P5:275; P6:308; P7:391
Harvard college observatory S2:57; S9:281; S10:46, 153; A2:176; A3:171, 586, 598; P5:226; P8:89.
Haverford college observatory....A1:540
Journal, Astronomical society, Canada....P15:257
Karlsrühe observatory....A2:281
Kiel observatory....P7:442
Leander McCormick observatory....S9:423
Lick observatory....S7:119; A3:416, 784
Lyons observatory....A2: 92
Melbourne observatory....S9:232
Morrison observatory....S7:219, 266
Munich observatory....P7:279

XUM

Volume and Page

Publications and reports, *(Continued)*
Nice observatory....S7:40; S10:297; P5:274; P7:441
O'Gyalla observatory....A2:645
Paris observatory....S10:296; A1:540; A2:474; P5:226; P7:442
Potsdam observatory....P6:366; P7:389, 442; P15:59, 314
Poulkowa observatory....A3:597
Prague observatory....A2:471
R. A. S. Memoirs....S9:421
Royal Irish Academy....A3:779; P14:124
observatory, Edinburgh....S10:301
Greenwich....P14:312; P15:121
Solar Observatory, Mount Wilson....P13:223
Stonyhurst observatory....A3:316
Tebbutts' observatory....A2:939
Toulouse observatory....P10:168
U. S. Naval observatory....S10:157; P5:501; P14:126, 578
science expedition....S9:238, 330
Vassar college observatory....P8:518
Vatican observatory....A1:632
Wanganui observatory....P14:122
Warner observatory....S6:119
Washburn observatory....S1:168; P3:535; P11:163, 459
Wolsingham observatory....A1:350; A2:382; A3:240
Yale observatory....S1:132; S9:142; P7:391
ξ *Puppis*, Spectrum of, *E. C. Pickering*....P9:222
Quartz fibre, *C. C. Hutchins*....S9: 90
Radial motion of stars with siderostat, *D. Deslandres*....A1:157
velocity spectrograms, Reduction of, *R. H. Curtis*....P15: 68
of 20 stars by Frost and Adams....P12:532
2 stars, Variable....P12:287
velocities of δ *Aquilae* and ϕ *Persei*....P11:344
Radiant energy, Absorption of....A1:823
through gaseous media, *S. J. Corrigan*....A1:1, 108
Probable effects of, *S. J. Corrigan*....A1:362
points of meteoric showers,—See Meteor Radiants.
Radiation of (heated) gases, *H. Crew*....A3:587
R. R. Tatnall....A3:153, 859
(rarefied) by K. Angström line....A2:647
motion of comets, Effects of....P13:282
the sun, Polar, *F. H. Bigelow*....A3: 25
Radio-activity....P13:227; P15:126
Radium, Earth's heat caused by....P13:226
Life history of....P12:682
Range finder, Swasey, *W. W. Payne*....P12:425, 450
Ratio of progression in number and light of stars....P9:466
Red glows, Origin of, *S. Bishop*....S5:129

Volume and Page

Red, *(Continued)*
light, *E. J. Brookings*.....S9:149
H. C. Maine.....S5:237
stars for color effect in parallax work, Observations of.....P14:488
near Nova *Velorum*.....P16: 63
Position of, *E. S. Holden*.....S1:102
sunsets, *J. R. Hooper*.....S5:126
Note on.....S4: 25
W. W. Payne.....S3: 18
Reduction of R. A.'s of normal system to fundamental, *E. S. Holden*.....S1: 46
Reflecting telescopes of large angular apertures, Failure of, *J. M. Schaeberle*.....P5:315
Reflector in America, *W. W. Payne*.....P8:510
Reflectors, *D. W. Edgecomb*.....P2:366
vs. refractors, *A. B. Dupuy*.....S8: 88
Refraction, Cause of, *H. M. Parkhurst*.....S10: 16
of rays of great wave-length, *H. Rubens* and *B. W. Snow*.....A2:231
on the measures of double stars, Effects of, *E. Doolittle*.....P5:143
phenomenon yet unexplained, *A. H. Babcock*.....P7: 51
tables, Leo de Ball's, *L. Courvoisier*.....P15:456
Untried method of determining, *G. A. Hill*.....P13:417
in zenith distance, *G. C. Comstock*.....S9:186
and aberration, Constants of, *G. C. Comstock*.....S6:310
Refractive index of liquid air, *Phil. Mag*.....A3: 64
Refractor (24-inch) of Lowell observatory, *T. J. J. See*.....P4:297
Refractors of the world, List of large.....P6:310, 420
Repulsive forces in nature, *T. J. J. See*.....P10:505
Reseau, Use of the, *H. C. Wilson*.....P8:562
Resisting medium in space, *A. Hall*.....S8:433
Reversing stratum, Its spectrum and that of the corona, *C. A. Young*.....P5:333
Reviews:—
Allen, R. H., Star names and their meanings *(W. W. Payne)*.....P7:427
Bailey, F. H., Primary phenomenal astronomy.....S5:128
Ball, Sir R. S., Star-Land.....S10:524
Barlow, G. W. C. and G. H. Bryan, Elementary mathematical astronomy, P1: 96
Barnard, E. E., Micrometrical observations of planet Eros.....P12:286
Brennan, M. S., New and old astronomy.....S9: 96
Bryant, W. W,. History of astronomy, *(Observatory)*.....P16: 80
Burnham, S. W., Double star catalogue *(R. G. Aitken)*.... P8:228; P15:404
Double star measures, 1900 and 1901.....P12:282
Micrometrical measures of 748 double stars *(W. W. Payne)*.....S3: 88
Byrd, M. E., Laboratory manual of astronomy.....P7:111
Questions on the sky.....P1: 92
Campbell, W. W., Handbook of practical astronomy.....A1:544
Chamberlin and Salisbury, Geology *(F. R. Moulton)*.....P14:327

XUM

Volume and Page

Reviews, *(Continued)*
Chambers, G. F., Descriptive astronomy S5:94; S8:272, 431
Handbook of descriptive and practical astronomy S9:287, 383
Pictorial astronomy for general readers S10:480
Charlier's general disturbance of Thetis by Jupiter S6:199
Clark, L., Star-Guide S5:191
Clerke, A. M., Astronomy during 19th century S5:158
Concise knowledge library,—astronomy, *(H. S. Davis)* P6:190
Herschels and modern astronomy P3:154
History of astronomy A2:846
Modern cosmogonies, *(T. J. J. See)* P14:313
Planet Venus A2:767
System of the stars S10:158
(W. W. Payne) P14: 71
Colas, J. A., Poole Brothers celestial handbook and celestial planisphere A2:382
Colbert, E., Mathematical tables to 4 places and fraction S6: 44
Tracing the fixed stars S6: 43
Collins, C., Introduction astronomy S9:382
Comstock, G. C. Field of astronomy for beginners P16:590
Field astronomy for engineers P11:111
New text-book of astronomy P9:288
Cosand, J., New theory of the universe P15:125
Czapski, S., Theorie der optischen instrumenten nach Abbe, *(H. Crew)* A3:241
Davis, J. W., Theoretical astronomy S10:479
Denning, W. F., Telescopic work for starlight evenings S10:303
Doolittle, C. L., Astronomy applied to geodesy and navigation, *(H. A. Howe)* S5: 63
Practical astronomy S4:255
Doolittle, E., Catalogue and re-measurement of Hough double stars, *(S. W. Burnham)* P15:624
Hough double stars P16:330
(G. W. Hough) P16:478
Doolittle, C. L. and E., Astronomical observations of Flower obs., *(T. J. J. See)* P14:393
Dreyer, J. L. E., Armagh catalogue of 3,300 stars S5:283
Catalogue of nebulae, *Observaotry* S7:175
(L. Swift) S7:405
Tycho Brahe S10:159
Fahie, J. J., Galileo, Life and Works, *(H. A. Howe)* P12: 80
Fauth, P., Moon in modern astronomy P15:450
Fisher, O., Earth *(G. F. Rodwell)* S1:213
Flammarion, C., Copernic et Découverte du Systéme du Monde S10:524
Planet Mars A2: 90
Frisby, E., Yarnall catalogue of stars revised S8:469

Volume and Page

Reviews, *(Continued)*
Frost, E. B., Translation of Die spectralanalyse der Gestirne, *(J. E. Keeler)* A3:688
Gassendo, P., Lives of Tycho Brahe and Copernicus *(A. J. Brooks)* P12:569
Giberne, A., Radiant stars P2:288
Sun, moon and stars A2:671
Gibson, F. M., Amateur telescopist's handbook P1:431
Glazebrook, R. F., Light, theoretical and practical *(H. Crew)* A3:402
Gore, J. E., Astronomical glossary A2:941
Catalogue of suspected variable stars S5:160
Catalogue of variable stars S8: 41
Planetary and stellar studies S7:414
Scenery of the heavens S9:191
Stellar heavens P12:70, 360
Studies in astronomy P12:628
Visible universe A2:670
Greene, D., Spherical and practical astronomy S10:478
Gregory, R. A., Planet earth P2:288
Hardy, A. S., Elements of quaternions S1:203
Heath, T. E., Our stellar universe P13:350
Hendrick, H. B., Catalogues of zodiacal stars, 1900-1902 ..... P16:195
Holden, E. S., Elementary astronomy P8:110
Houzeau, J. C., Bibliographie generale de l' astronomie S9: 91
Howe, H. A., Elements of descriptive astronomy P5: 56
Study of the sky P4:166
Huggins, W. H., Arabic names of the stars S2: 52
Huggins, Sir W. and Lady, Representative stellar spectra, *(W. W. Payne)* P8:323, 365
Jones, G. W., Logarithmic tables A2:383
Jordan, W. L., Astronomical and historical chronology *(R. W. McFarland)* P13:112
Kennedy, C., Few chapters in astronomy P2:287
Kirkwood, D., Asteroids, or minor planets S7: 95
Klein, H. J., Star atlas S8:142
Langley, S. P., New Astronomy *(F. H. Brackett)* S7:270
(W. W. Payne) S7:317
Lewis, Struve double stars, *(S. W. Burnham)* P14:523
Lockyer, J. N., Dawn of astronomy A3:259; P1:429
Elementary lessons in astronomy S9:192
Meteoric hypothesis S10: 48
Loomis, E. Y., Eclipse party in Africa, *(M. Proctor)* P4:455
Lowell, P., Solar system P11:464
Lynch, E., Solar and planetary physics and motion P16:198
Lynn, W. T., Celestial motions S8:477; P1:383
Remarkable comets P1:383
Macpherson, H., Jr., Astronomers of to-day and their work P13:284

XUM

Volume and Page

Reviews, *(Continued)*

Martin, M. E., Friendly stars, *(F. E. Harpham)*.....P15:384
McFarland, R. W., Era at hand.....P3:486
McLennon, E., Cosmical evolution.....A1:847
Century of progress in astronomy.....P15: 61
Through the depths of space.....P16:523
Mitchel, F. A., O. M. Mitchel *(H. A. Howe)*.....S7: 95
Monck, W. H. S., Introduction to stellar astronomy.....P9:359
Mouchez, Admiral, Catalogue of Paris observatory.....S7: 45
Moulton, F. R., Introduction to astronomy.....P14:445
Naegamvala, K. D., Total solar eclipse, 1898, India.....P11:161
Nasymth (Jas.) and Carpenter (Jas.) The Moon.....S5: 62
Newcomb and Holden, Astronomy.....S2:228
Norton, W. A., Astronomy.....S1:138
Obrecht's Catalogue *(G. O. James)*.....P16:432
Oliver, J. A. W., Astronomy for amateurs.....S7:127
Page, W. M., New light from old eclipses.....S10:110
Parker, W. H., Familiar talks on astronomy.....S9:190
Perry, Father, A. L. Cortie.....S9:431
Peters, C. H. F., Catalogue of stars, *(Utica Herald)*.....S6:352
Pickering, W. H., Lunar and Hawaiian physical features compared..P15: 62
Potsdam photometric Durchmusterung.....P15: 59
Proctor, M., Astronomical charts.....P9:165
Stories of starland.....P6:368
Proctor, R. A., Old and new astronomy.....S7:218, 312
completed by A. C. Ranyard, *(M. Proctor)*.....A2:669
Students' atlas in 12 circular maps.....S8:239
Treatise on astronomy.....S6:270
Roberts, I., Collection of astronomical photographs.....A3:693
Royal Obs. Belgium, Double star measures, *(S. W. Burnham)*.....P13: 15
Russell, H. C., Star camera.....A1:631
Safford, T. H., Catalogue of north polar stars.....S8:279
Sawyer, E. F., Catalogue of southern stars, *(Salem Press)*.....S5:299
Scheiner, Dr., Die spectralanalyse der Gestirne.....A1:934
Schiaparelli, G., Astronomy in the Old Testament.....P14:187
Science year book for 1905.....P13:169
Serviss, G. P., Astronomy with an opera glass.....S8:336
Other worlds.....P10:112
Pleasures of the telescope, *(H. A. Howe)*.....P9:286
Sharpless, I., Astronomy.....S1:204
Smyth, C. P., Mean Scottish Meteorology.....S8:327
Smyth, W. H., Cycle of celestial objects.....S5: 95
Stebbins, J., Photometric observations of double stars.....P16:257
Stroobant, P., Astronomical observations and astronomers.....P15:579
Swift, L., Catalogue of nebulae.....S7: 38

Volume and Page

Reviews, *(Continued)*
Todd, D. P., New astronomy for beginners P6: 63
Stars and telescopes, *(M. Proctor)* P7:335
Todd, M. L., Corona and coronet days P7:279
Upton, W., Star atlas P4:456
von Oppolzer, E. R., Lehrbuch zur Bahnbestimmung der Kometen und Planeten S2:320
Warren, H. W., Recreations in astronomy S2:195
Watts, W. M., Spectrum analysis P12:687
Webb, T. W., Celestial objects for telescopes S1:203
common telescopes P1:384
Sun and his phenomena S4:160
Williams, A. S., Zenographical fragments S8:383
Willson, R. W., Laboratory astronomy P14:317
Winchell, A., World life *(W. W. Payne)* S2:312
Young, C. A., Elements of astronomy S9:95; P5:447
General astronomy ..... S8:335, Cor. S8:411
revised, *(W. W. Payne)* P6:461
Lessons in astronomy P4:277
including Uranography S10:383
Manual of astronomy, *(W. W. Payne)* P10:394
Supplement to "The Sun" P5:227, 332-4
Rhea from an eclipse, Emersion of, *C. A. Young* S10:251
Rigel and the great nebula S9:425
Right ascension circle, Automatic, *L. Swift* S8:349
Rings, Process of disintegration, *R. Hooke* A2:766
M. W. Meyer ..... A2:407, Cor. A2:765
Rittenhouse, D., *H. S. Davis* P4: 1
Rock salt for optical purposes, *J. A. Brashear* S5:149
J. E. Keeler S5:222
Note A3:240
Rodger, John, Death of S1: 98
Roemer, O., Historical sketch of, *T. J. J. See* P11:226, 461
Rotation of earth on its axis, Evidence of P14:183
of Venus and Mercury, *S. C. Chandler* P4:393
T. J. J. See P4:533
time a function of density, *S. J. Corrigan* S8:210
Rowland's concave gratings, Astigmatism of, *J. L. Sirks* A3:763
Asymmetry in, *J. R. Rydberg* A2:439
diffraction gratings, Ives replicas P13:228
Rutherford photographs, *F. E. Harpham* P8:129
Sagittarii, Nova, *E. C. Pickering* P7:277, 504
ζ *Sagittarii*, Orbit of, *R. G. Aitken* P9: 57
T. J. J. See A2:510
San Miguel mountain as an observatory site P13:529
Satellites, Announcing discoveries of, *W. W. Campbell* P14:135, 252

XUM

Volume and Page

Satellites, *(Continued)*
Announcing discoveries of, *A. C. D. Crommelin*.....P14:147, 380
C. D. Perrine.....P14:135, 252
Discoveries by Americans, *W. W. Payne*.....P13:120
Ephemerides of, *J. Morrison*.....P6:165
Measurable disks of, *T. J. J. See*.....P9:471
Saturn, *W. W. Payne*.....S3:101
H. C. Wilson.....S5: 58
Drawing by H. Pratt of, *E. S. Holden*.....S3:249
Equatorial diameter of, *F. E. Seagrave*.....P10: 54
Five views of, *C. B. Hill*.....S7:122
Hints to observers of, *B. J. Hopkins*.....S4: 49
Markings and rotation period of, *W. F. Denning*.....P12: 40
Observations of, *J. A. Brashear*.....S8:188
J. E. Keeler.....S7: 79
E. L. Trouvelot.....S10:74, 119, 171
Occultation of 1900, *R. O'Halloran*.....P8:399
M. Moye.....P8:401
F. E. Seagrave.....P8:407
T. D. Simonton.....P8:404
Rotation period of, *H. C. Wilson*.....P11:443
Spectroscopic observations of, *J. E. Keeler*.....P2:443
Tores of, *P. Lowell*.....P16:133, 394
Transparency of crape ring of, *E. E. Barnard*.....A1:119
White spot on, Notes.....S8:189, 190, 191, 236
E. E. Barnard.....P11:408
Saturn's ring, White region of, *W. R. Brooks*.....S8:233
rings, *G. C. Comstock*.....S10:468
M. E. L. Trouvelot.....S4: 78
H. C. Wilson.....A3:260
Disappearance of, *C. Burckhalter*.....P16:127
Ephemeris of, *J. Morrison*.....P6:389
Galileo's work on, *E. A. Partridge* and *H. C. Whitaker*.....P3:408
Measures of, *F. E. Seagrave*.....P11:145; P12:131
Note on.....S10: 45
Reversed curvature of shadow of, *A. Jenks*.....S9:255
Stability of, *G. W. Coakley*.....S9:3, 67
satellite IX, Phoebe.....P14:640
satellites.....S2:194; S5:297; P12:499
IX and X, *W. H. Pickering*.....P14: 17
E. S. Holden.....S8: 1
E. C. Pickering.....P7:221, 233
W. H. Pickering.....A1:649
Saturn and η *Geminorum*.....S5:123
Uranus observations with 36-inch, *E. E. Barnard*.....A3:557
Saturnian ball and ring system, *E. E. Barnard*.....P2:295

Volume and Page

Saturnian, *(Continued)*
system, *D. G. Parker*.....P12:405
Scales of seeing, *A. E. Douglass*.....P6:193
School of practical astronomy, *E. S. Holden*.....S4:116
Science by co-operation, *T. Lindsay*.....P4: 84
Recent advances in, *W. Crookes*.....P7: 3
Scientific progress during 19th C., *Knowledge Year Book*.....P9:91, 128
Scintillation of the fixed stars, *T. J. J. See*.....P5:463
β^1 and β^2, *Scorpii*, Occultation, 1883 of, *W. H. Numsen*.....S2: 91
η^1 *Scorpii*, Spectroscopic binary, *E. C. Pickering*.....P4:273
R and S *Scorpii*, *R. O'Halloran*.....P4:275; Cor. P4:331
Seismic motion and other phenomena, *F. Omori*.....P14:543
Sensitiveness in dry plates, Change of, *W. W. Campbell*.....A2:860
G. W. Hough.....A3:153
Sensitometry, Studies in.....P15:319
Sextant, Adjustment of, *G. C. Comstock*.....S7:129
J. M. Schaeberle.....S7:223
Determining eccentricity of, *C. C. Hutchins*.....P11:353
Shadow-bands, *E. Holmes*.....P14:319; P15: 77
Shooting stars and aerolites, *W. F. Denning*.....A1:481
Cometary, *H. A. Newton*.....A3:196
Double, *L. Swift*.....S8:454
Physics of, *J. F. Lanneau*.....P13:434
Sidereal day, *J. Morrison*.....P15: 12
heavens, Growth and magnitude of, *W. H. Lamaster*.....P3:226
system, Center of, *J. Ennis*.....S2:113
universe, Structure of, *T. W. Backhouse*.....S9:337
Silvering glass mirrors, *C. H. Chandler*.....A2: 93
A. A. Common.....A1:852
Sirian and solar stars, *W. H. S. Monck*.....A1: 89
Sirius, *N. M. Mann*.....S2:136
in ancient times, *T. J. See*.....P2:193
Color of, *W. T. Lynn*.....A1:634
Companion to, *A. Hall*.....S3:179
M. McNeill.....S5:182
Orbit of.....P12:501
T. J. J. See.....A3: 82
History of color of, *W. H. Pickering*.....Cor. A1:640
T. J. J. See.....A1:269, 372, 550
Observations.....S2:126
Orbit of, *N. M. Mann*.....P4:482; P7:443
Spectrum of, *W. Huggins*.....S9:318
System of, *N. M. Mann*.....S7:25, Cor. S7: 94
Sky, Apparent figure of, *F. Schlesinger*.....P7:117
Color of, *W. W. Payne*.....P14: 5
at high altitudes, Blueness of, *E. E. Barnard*.....A2:750

XUM

Volume and Page

Sky, *(Continued)*
from Pike's Peak....A3:150
travellers, Four little, *E. E. Barnard*....P3:143
Slough, Visit to, *D. W. Edgecomb*....S9: 52
Solar, See also Chromosphere, Corona, Eclipse, Prominence.
Solar activity, 1888....S8:267
L. G. Léon....P12: 66
apex, *T. C. Ryan*....P15:205, 336
atmosphere, Brester's views of tranquility of, *A. Brester, Jr*....A3:849
Heat in the, *W. E. Wilson*....A1: 49
New researches on, *H. Deslandres*....A1:60, 314
Thermal absorption in, *E. B. Frost*....A1:720
constant by S. P. Langley....S1:271
Recent studies in, *H. J. Cox*....P13:147
contraction, Helmholtz's theory of, *E. Doolittle*....P3: 21
Corona, Mechanical theory, *J. M. Schaeberle*....S9:214
April, 1893, *J. M. Schaeberle*....A2: 7
of eclipse, Predictions of, *F. H. Bigelow*....A2: 97
cycle, *R. W. McFarland*....S8:353
Details of the recent, *R. O'Halloran*....P12: 27
cyclones, *R. O'Halloran*....P7:331
diameter, Variation of, *O. T. Sherman*....A1:513
disturbances, June 17, 1891, *H. H. Turner*....A1: 67
July 15, 1892, *G. E. Hale*....A1:611
H. C. Lord....A1:738
J. S. Townsend....A1:815
and terrestrial phenomena, *G. E. Hale*....A2:167
W. W. Payne....P11:374
T. S. H. Shearman....S10:279
W. Sidgreaves....A1:817
M. A. Veeder....S10:381
energy, Selective absorption of, *S. P. Langley*....S2: 59
Source and maintenance of, *J. Morrison*....P10:409
eruption....S3:185
halo and mock suns, *J. M. Boraston*....A1:522
heat and gravitation, *E. S. Crawley*....S7:325
J. K. Kedzie....S7:438
W. H. S. Monck....S7:440
hemisphere, Relative activity in, *E. B. Frost*....S9:109
image reflected in seas of Mars, *J. R. Holt*....A3:257
motion, Determination of, *M. W. Whitney*....P12:226, 311
Problem of, *T. H. Safford*....A2: 1
M. W. Whitney....P5:309
observations, *C. A. Bacon*....S9:182
D. E. Hadden, S10:38; P7:408; P8:222; P10:254, 348; P11:488; P13:196; P14:603; P15:607.

Volume and Page

Solar, *(Continued)*
observations, *P. Tacchini*...A1:214, 520, 608; A2:39; A3:244, 312, 503, 588
observatory, Mount Wilson, *G. E. Hale*....P15:563
W. W. Payne....P14:312; P15:121
parallax, *H. C. Wilson*....A1: 95
from observations of Eros, *S. J. Brown*....P8:353
Probable value of, *T. J. J. See*....P11:460
by spectroscopic observations of Venus, *K. Burns*....P15:556
phenomena, Associate, *M. A. Veeder*....S9:279
Distribution in latitude of, *P. Tacchini*..A1:134, 424, 711; A2:262, 425
Photographs of, *G. E. Hale*....A1:603
photography at Kenwood observatory, *G. E. Hale*....A1:407
physics, Contributions to, *E. R. von Oppolzer*....A2:736
Problems of, *A. L. Cortie*....P15:173
prominences, *H. C. Wilson*....S7:304
Distribution of, (1891), *J. Evershed, Jr*....A1:426
Effect of light on spectrum of, *M. Fizeau*....A1:126
with grating spectroscope, How to see, *E. E. Read, Jr*....S10:369
Measurement of, *H. Crew*....A1: 90
Notes....S9:182, 229, 278, 325, 374, 417; S10:39, 95, 149
J. Fenyi....A2: 37
A. F. Miller....A1:614
W. Sidgreaves....A1: 66
E. L. Trouvelot....A1:124
photography, *J. Evershed, Jr*....A1:827
Results in, *G. E. Hale*....A1: 70
Spectrum of, *G. E. Hale*....A1:50, 602, 618, 821
Velocity of, *J. Fenyi*....A1: 63
research, Yerkes expedition for....P12:503
spectrum, *A. L. Cortie*....A1:393
Group B of....S3:280
Higg's map of, *G. E. Hale*....A3:151
Normal, *H. A. Rowland*....S5: 85
Rowland's maps of....S8:140
Scales of intensity for lines of, *L. E. Jewell*....A2:815
Studies on, *A. L. Cortie*....A1:393
spots and faculae, *W. Sidgreaves*....A1:212
statistics in 1892, *R. Wolf*....A2:263
surface, Recent studies in, *R. O'Halloran*....P16:484
system, Development of, *D. Kirkwood*....A2:594
Electric phenomena in, *J. Ennis*....S5:234
Goldschmidt's law applied to, *W. H. Hobbs*....P15:345
Magnitude of, *W. Harkness*....A3:605
Mechanics of....S9:186
Motion of, *J. G. Porter*....A1:764
(Potsdam observations)....A2:563

XUM

Volume and Page

Solar, *(Continued)*
system vortices, *W. W. Payne*.....P16:555
and auroral coincidence, *S. P. Langley*.....S1: 55
Solution for *n*.....P6:361
Sound velocity, *S. Goodenow*.....S8:307, 382
Southern zones, Dr. Gould, *E. S. Holden*.....S1: 44
Space infinite? Is star strewn, *A. M. Clerke*.....P4:431
Specter of the Brocken, *J. M. Schaeberle*.....S10:136
Spectra,—See name of object.
of alkalies, Ultra-red in stellar, *E. C. Pickering*.....A2: 73
binary stars, *W. H. S. Monck*.....A1:326
comets *b* and *c* 1893, *W. W. Campbell*.....A3:571
influenced by slit-width, *H. Kayser*.....A3:367, 399, 505
Nature of, *H. Kayser*.....A3:586
copper salts, Absorption.....A2:846
Distribution of energy in stellar, *E. C. Pickering*.....A1: 22
elements, Work of Kayser and Runge, *J. S. Ames*.....A2:226
W. N. Hartley.....A1:223
Kayser and *Runge*.....A2:802
C. Runge.....A1:496; A3:128
C. A. Young.....P5:332
flames, *G. D. Liveing* and *J. Dewar*.....A1:215
at high temperature.....A2:647
of metallic compounds, *G. D. Liveing* and *J. Dewar*.....A2:434
gallium, Electric.....A1:520
lightning.....S9:295; S10:378
metallic films.....A1:528
metals, Infra-red, *E. P. Lewis, E. S. Ferry*.....A3:747
Mapping the, *H. Crew* and *R. Tatnall*.....A3:741
by Professor Hasselberg.....A3:585
new stars, *H. Ebert*.....P12:239
Orion nebula and stars, *W. W. Campbell*.....A3: 494, 695
J. E. Keeler.....A3:476
stars of large proper motion, *J. E. Gore*.....A1: 11
Milky Way, *J. E. Gore*.....A1:326
having peculiar, *M. Fleming* A1:27, 418, 765; A2:170, 546, 810; A3:501
E. C. Pickering.....P5: 52
Suitable nights for observing planetary, *W. W. Campbell*.....A3:860
sun and Nova *Aurigae* compared, *H. Deslandres*.....A1:712
metals compared photographically.....A1:336
sun-spots, *A. L. Cortie*.....A1:587
Photography of, *C. A. Young*.....A2:649
and chromosphere.....A1:613
photosphere.....A1:241
proper motions of stars, *W. H. S. Monck*.....A1:389, 700; A2:513
Spectral lines, Intensity of, *E. C. Pickering*.....P11:384

Volume and Page

Spectrograph, Potsdam, *E. B. Frost*.....A2:150
Spectroheliograph, *G. E. Hale*.....A2:241
of modern observatory.....P13:525
for Yerkes telescope, *G. E. Hale*.....A3: 64
Spectroscope, Adjustment of, *C. A. Young*.....P5:318
Combination of prisms for stellar, *H. F. Newall*.....A3:309
for small telescopes, *D. E. Hadden*.....P3:84, 152; P12:252
E. T. Whitelow.....P12:363
in astronomy, *T. Reed*.....P2:266,297, 402; P3:141
eclipse work, *E. W. Maunder*.....P6:376
recent chemistry, *R. A. Gregory*.....P3: 70
studying solar prominences, *W. Sidgreaves*.....A1:136
variable stars, *T. Reed*.....P3:333
of Halsted observatory, *C. A. Young*.....A1:292
Lick observatory, *J. E. Keeler*.....A1:140
Modern, *J. S. Ames*.....A1: 28
Allegheny observatory, *J. E. Keeler*.....A2: 40
Edinburgh observatory, *L. Becker*.....A2:542
Tulse Hill, *A. Huggins*.....A2:615
Use of, *E. J. Wall*.....P14:336
and some of its applications, *J. E. Keeler*—
I Principles involved in construction.....P1: 9
II Wave-length scale and solar spectrum.....P1:102
III Practical details of adjustment and use.....P1:169, 200
IV Spectra of elements.....P2: 20
Spectroscopes, Efficiency of, *J. E. Keeler*.....S10:433
Fixed-arm, *F. L. O. Wadsworth*.....A3:835
Spectroscopic binaries.—See Double Stars, Binary Stars, and Names of Stars.
η *Pegasi*, Orbit of.....P9:521
in *Puppis*, *E. C. Pickering*.....P4:390
Orbits and velocity curves of, *J. M. Barr*.....P16:259
Velocity curves of.....P15:644
determinations, *G. J. Stoney*.....A1:935
investigations at Swedish academy, *B. Hasselberg*.....A1:793
of Mr. Higgs, *G. E. Hale*.....A3:151
measurements, Interference methods applied to, *A. A. Michelson*.....A1:884
observations on Mount Blanc, M. Janssen's.....A2:845
Reduction of, *W. W. Campbell*.....A1:319
properties of dust.....S10: 9
Spectroscopy, Pending problems, *G. E. Hale*.....S10: 89
at Stonyhurst, *G. E. Hale*.....A3: 58
of sulphur, *B. Hasselberg*.....A2:347
Spectrum of the aurora, Photographic, *E. C. Pickering*.....P6:309
chromosphere, *C. A. Young*.....A1: 59
D_3 line in.....A3:585
comet *a* 1892, (Swift), *W. W. Campbell*.....A1:523, 698

XUM

Volume and Page

Spectrum of, *(Continued)*
comet *b* 1892 (Holmes), *J. E. Keeler*....A1:929
α Herculis, *T. E. Espin*....A3:651
hydrogen, Investigations of....A1:160; A2:171
Schumann's Investigations of....A2:171, 365
lightning, *E. C. Pickering*....P10:104
liquid oxygen, *G. B. Liveing* and *J. Dewar*....A1:705
lines caused by change of pressure, *C. A. Young*....P5:334
β Lyrae, *J. N. Lockyer*....A3:575
E. C. Pickering....A1:25; A3:584
magnesium arc....P3:213
Mars, *W. Huggins*....A3:771
a meteor, *E. C. Pickering*....P5:442
nebula SD — 12°1172....A3:159
nebulae, Wave-lengths in, *J. E. Keeler*....A2:733
Nova *Aurigae*, *W. W. Campbell*....A1:529, 799
H. Crew....A1:231
Orion nebula, *W. W. Campbell*....A3:695
W. Huggins....A3:568
J. N. Lockyer....A3:574
oxygen line, *J. S. Ames*....A3:505
B. Hasselberg....A3:760
stars of 1st and 2d types, *E. W. Maunder*....A1:145
W. H. S. Monck....A1:437
sulphur, *J. S. Ames*....A2: 50
sun in eclipse, 1893, *T. Reed*....A1:926
Langley's investigation of....S1: 62
sun-spots, 1892, *H. Crew*....A1:308
G. E. Hale....A1:159, 310
Invisible....P3:215
Limit of light in, *W. Huggins*....S9: 22
New, *S. P. Langley*....P9:415
photography, Short focus camera advantage in, *J. E. Keeler*....A3:772, 857
Stellar, *W. de W. Abney*....A2:273
rays, Limits of visibility of....A1:296
Speculum, New paraboloid, *E. M. Tydeman*....P5:559
Story of a, *A. W. Quimby*....P5: 26
Sphere into congruent parts, Subdividing, *H. C. Goddard*....P10:406
Spiral nebulae, Significance of, *T. J. J. See*....P14:614
Squares of consecutive numbers, Rule for, *P. Hall*....P9:161
Standard scale for telescopic observation, *P. Lowell*....P11:34, 218
W. H. Pickering....P11:113
Standard time, Progress in, S1:16, 41, 43, 180, 184; S4:88, 125; S5:120; S8:452; S9:57, 113, 139, 231, 331, 470; S10:46, 151, 157.
in U. S., Sources of, *R. G. Aitken*....P9: 12
Standards for astronomical and physical instruments, *J. A. Brashear*....S7: 77

Volume and Page

Standardizing photographic films, *F. H. Bigelow*.....S10:385
Star of 1572, New.....S4: 81
A.G.C. 6886 having large power motion, *E. C. Pickering*.....P13:503
O.Arg.S 15,292, Magnitude of, *E. C. Holden*.....S1:199
of Bethlehem, *J. T. Ellis*.....S6:360
J. Morrison.....P11:88, 122
W. W. Payne.....S4:110; S6:265
J. G. Porter.....A2: 6
L. Swift.....A2:105
A blazing, Chicago *Tribune*.....S5:269
catalogues:
Colored stars.....A2:925
Common system of, *W. A. Rogers*.....A2:169, 204
compared.....S3:246
corrected.....S6:296
Lalande's catalogue, *E. S. Holden*.....S1:198
New general catalogue, *G. F. Chambers*.....S9:203
T. H. Safford.....S2: 88
Perth catalogue of 420 standard stars, *W. E. Cooke*.....P16:192
Peters-Borst catalogue.....S8:138, 456
Photographic catalogue of north polar stars, *C. E. Furness*.....P9: 1
Southern stars (3415).....A2:473
clusters, *R. Sprague*.....P1:407
colors, *J. H. Eadie*.....S7:219
dust, *J. K. McBroom*.....P11:544
D. E. Wing.....P11:481
Lacaille 4955, Proper motion of, *E. S. Holden*.....S1:199
names from Arabic, Pronunciation of, *R. H. West*.....P2:209
New nebulous.....S5:154
preceding β *Capricorni*.....S3:120-1
Relation between color and age of a, *W. M. Pearson*.....S9:297
shower, Approaching, *L. Swift*.....P7:415
studies with opera-glass, *W. W. Payne*.....S3: 51
systems, Life history of, *H. L. Clarke*.....P3:489
temperature, Magnesium spectrum an index of, *J. E. Keeler*.....A3:660
Yarnall, 3106, Observations of, *E. S. Holden*.....S1:169
Star's image in field of a parabolic reflecting telescope, *J. M. Schaeberle*..P6: 33
position, from photograph, To obtain, *C. D. Perrine*.....P15:259
Stars—See also Binaries, Double Stars, Spectroscopic Binaries, Variables, and star Names.
Age of the, *M. Janssen*.....S7:202
T. J. J. See.....P6:361
H. C. Wilson.....S7:173
Among the, *E. S. Holden*.....P8:531
with annual motion of 1″ and over, *J. G. Porter*.....P8:382
in *Coma Berenices*, *W. C. Kretz*.....P9: 75

XUM

Volume and Page

Stars, *(Continued)*
Constitution of the, *E. C. Pickering*....A2:718
Distances of the, *D. Gill*....S3:216
W. W. Payne....P1:129
fixed, *J. M. Schaeberle*....P15:412
Note on....S1:161; P15:517, 583
Distribution of the, *A. M. Clerke*....A2:515
H. Macpherson, Jr.....P15:400
W. H. S. Monck, S4:56; S7:20, 73, 105, 236; S10: 409, 453.
Doppler's principle of distances of the....A2:472
Explosion of, *A. W. Bickerton*....P12:666
Evenings with, *M. Proctor*....P4:321, 374, 436, 515, 562
Fixed, *W. H. S. Monck*, P1:195, 300, 385; P2:60, 108; P3:62; P4: 259; P5:467.
Images of, *A. Hall*....S5: 97
with large proper motions, *J. G. Porter*....S4:188
in line of sight, Motion of....P14:316
Missing, + 4°3555....P5:218
+ 7°5106....P5:220
+ 46°3019....P5:219
BD + 17°344....P13:275
BD + 37°855....P13:275
near north pole, *W. W. Payne*....P12:265
Pleiades, Number and distribution of, *H. C. Wilson*....P15:193
Nearer to the, *E. E. Barnard*....P2:245
in northern hemisphere, *H. Seeliger*....S4: 33
Number of the, *G. J. Burns*....P12:267
W. Gibson....P14:594
Occultations of, by dark limb of moon....S6:162
with an opera-glass, *G. P. Serviss*....S10:244
Parallax of the, *W. H. S. Monck*....S8: 62
Parallaxes of southern, *E. S. Holden*....S1:133
that periodically glow and fade, *R. O'Halloran*....P11:294
Photographs of faint, *E. C. Pickering*....P15:171
Proper motion of, *W. H. S. Monck*....A1:253
Relative brightness of....P13:283
Schaeberle on distances of fixed....P15:583
Searching for new, *T. D. Anderson*....P10:246
Shooting, *W. F. Denning*
1. General remarks....P1: 34
2. Preliminaries of observation....P1: 67
3. Radiation and radiant points....P1: 97
4. Observation of meteors....P1:147
5. Radiation and duration of meteor showers....P1:208
The August Perseids....P1:267; Cor. P1:333

Volume and Page

Stars, *(Continued)*
Shooting, showers of Leonids P1:296
Andromedes of Biela's comet P1:345
Fireballs P1:438
Size of, *W. W. Payne* P14:164
Southern zone S3:153
Sparsity of the, *J. F. Lanneau* P15:390
Spectra and proper motions of, *W. H. S. Monck* A2:811
Systematic motions of the P15:122
Temporary, *H. M. Parkhurst* S6:118
Time, *E. S. Holden* S1:124
Variability of red, *E. S. Holden* S1:134
visible at Lowell observatory, Chart of, *P. Lowell* P13:391
and the galaxy, Systematic, *W. H. S. Monck* P14:419
Milky Way, *M. E. Byrd* P6:288
planet finder, Barrett-Serviss' P14:444
Star-correction machine, *D. T. Wilson* P10: 82
Star-ratio, Significance of, *G. C. Comstock* P15:131
Star-streaming by A. R. Hinks P14:315
Starlight, Brightness of, J. E. Gore P9:506; P10:227
Shadows cast by, *H. N. Russell* P10:242
Starry heavens, Extent of, *W. W. Payne* P11:411
Stellae novae, *H. S. Davis* P9:284
Stellar astronomy, Aims of, *T. J. J. See* P5:194
bands in zodiac from *Gemini* to *Scorpio*, *A. E. Douglass* P5:511
characters, Correlation of P16:392
evolution, Dunér and Scheiner, *Vierteljahrschrift* P6: 85
floor, *E. L. Larkin* P10:252
magnitudes by photographs, *E. S. Holden* S9: 12
Standards of, Committee report S4:20, 43
E. C. Pickering S4:24; P15:303
motion, Mean speed of P11:222
and velocity of wave propagation, *L. d' Auria* P11:254
nature of ether, *L. d' Auria* P11:254
motions, Photographic determination of, *E. C. Pickering* A3:521
parallax, *C. W. Pritchard* S8: 93
parallaxes, Table of, *H. Sadler* S9:342
photography, *M. Wolf* A2:622
E. E. Barnard S6: 58
criticized, Harvard plans for S8:377
photometer A2:563
photometry, *H. M. Parkhurst* A3:652
C. M. Smith P5:117
Note on A2:646
places determined by photographic method, *F. H. Bigelow* A1: 42
rotation, Spectroscopic determination of, *J. R. Holt* A2:646

XUM

Volume and Page

Stellar, *(Continued)*
scintillation, Theory of, *Lord Rayleigh*....A2:834, 921
spectra, Notes on....A3:158
Lockyer's researches on, *J. E. Keeler*....A3: 59
studied photographically....S6:222; S8:228
systems, Absolute dimensions of, *H. C. Wilson*....P3:216
origin of, *T. J. J. See*....S10:179
Researches in evolution of, *S. W. Burnham*....P4:471
types, Distribution of, *J. M. Boraston*....A2: 57
Stereoscope applied to astronomical researches, *G. Van Biesbroeck*....P12:318
Stone, Ormond, *F. P. Matz*....P3:452
Strassburg observatory of royal university, *H. C. Wilson*....P5:171
Struve double stars, Observations of, *W. J. Hussey*....P7:153
Struve's testing of his Clark objective....S2:124
Sun....S1: 15
Apparent size of, *C. H. Chandler*....P7:342
Constitution of....S1: 9
W. Sidgreaves....A2:826
C. A. Young....P12:221
Distance and constitution of, *W. W. Payne*....S7:100
Effective temperature of, *W. E. Wilson* and *P. L. Gray*....A3:382
in high altitudes, Study of....S1:193
Is there oxygen in atmosphere of? *N. C. Dunér*....A3:215
January, 1904, *L. G. Léon*....P12:284
as a magnetized sphere, *F. H. Bigelow*....P14:37, 463
observations at Syracuse university, *E. D. Roe, Jr*....P16:127
Photograph of, *H. C. Wilson*....P8: 94
Photographic study of, *G. E. Hale*....A1:811
Photographing, *W. W. Payne*....P2:116
flocculi of....P14:311
Photography and figure of the, *W. W. Payne*....P13:475
Present knowledge of, *W. W. Payne*....P12:293
measurements of distance of....P15:385
Spectroscopic observations for parallax of, *Observatory*....P11:219
Stellar magnitude of, *W. Ceraski*....P14:226
Studying corona of, *H. H. Turner*....P14:548
Temperature of, *H. LeChatelier*....A1:517
Theory of, *A. Brester, Jr*....A2:914; A3:218
J. Janssen....A3:238
Transit circle observations....S8:470
a variable star....P14:447
"Sun," Supplemental notes to Professor C. A. Young....P5:277, 332
Sun's atmosphere, Brester's views on, *E. von Oppolzer*....A3:581
chromosphere, *S. J. Perry*....S4: 51
distance from observing Eros, *W. W. Campbell*....P9: 88
H. C. Wilson....P12:149

and Page Volume

Sun's, *(Continued)*
Corona, Electro-magnetic theory of, *H. Ebert*....A2:804
M. I. Puppin....A2:928
Diameter, Variation of....A3:183
Effect on terrestrial magnetism, *Lord Kelvin*....A2: 74
equatorial acceleration, *E. J. Wilczynski*....P6:209
C. A. Young....P5:335
heat, *W. H. S. Monck*....A3:823
A. S. Young....P6:145
Source of, *J. F. Lanneau*....P14:410
and radium, *R. J. Strutt*....P12: 75
motion referred to group of fainter stars, *G. C. Comstock* P12:112; P15:190
in space and fixed stars, *W. H. S. Monck*....P16:239
photosphere, Nature of....A2:926
rotation determined by faculae, *A. Belopolsky*....A2:632, 637
Dr. Wilsing....A2:635
surface (1892) and terrestrial magnetism, *G. E. Hale*....A1:917
W. W. Payne....S7:225
Sun and his system, *N. Lockyer*....P9:123
moon, First observations of, *M. E. Byrd*....P1:216, 252
near horizon, Apparent enlargement of, *T. J. J. See*....P8:362
Nova *Aurigae* compared spectroscopically, *H. Deslandres*....A1:712
stars in space, *W. S. Monck*....P10:307
Venus, Diameters of, *H. C. Wilson*....A1: 95
Sun-dials and Ahaz, *H. S. Davis*....P7:102
J. H. Earp....P7:167
B. S. Easton....P7:242, 277
R. M. McCreary....P7:167
R. R. McLeod....P7:108
J. Morrison....P6:537; P7:102-3, 368
S. A. Saunders....P7:206, 444
L. Swift....P7:51, 167; P10:278
Sun-spot, Area and position of great....A1:335
cycles compared with Scottish meteorology, *C. P. Smyth*....S8:385
maximum, *J. F. Lanneau*....P12: 67
of 1905, *R. O'Halloran*....P14:368
mimimum, *R. O'Halloran*....P6:479
observations: *E. Brown*, A1:925, A2:74; *E. B. Frost*, S9:183; *D. E. Hadden*, P11:560; *R. O'Halloran*, P4:570, P7:278, P9:412, P11:579; *H. C. Wilson*, A1:248, P2:49.
at Goodsell observatory, S9:230, 280, 325, 418, 468; S10:37, 102, 150; A3:293.
Meudon observatory, by M. J. Janssen....A1:334
Mount Holyoke observatory, S10:37; 1900-01, P10:167; 1902-3, P12:214; 1904, P13:168; 1905, P14:111; 1906, P15:127; 1907, P16:188.

XUM

Volume and Page

Sun-spot observations at, *(Continued)*
Smith observatory..S9:137, 182, 230, 278, 375, 417, 467; S10:36, 103
in 1885, *R. H. Ferguson*.....S4:238, 261
1891, *A. L. Cortie*.....A1:130
J. Fenyi.....A1:430
1903, *J. F. Lanneau*.....P11:372
L. G. Léon.....P12:216
1905, *Th. Moreux*.....P13:168, 194
1907, *E. D. Roe, Jr*.....P15:447
periods, Maxima and minima of, *S. Hirayama*.....P15:188
positions measured by Stonyhurst disks, *A. L. Cortie*.....P16:426
Recent cyclonic, *R. O'Halloran*.....P7:278
spectra.....A1:162
photographed.....A2:171
variation in latitude, *E. W. Maunder*.....P12:616
zones, Spoerer's law of.....P11:407
and its influence.....A1:527
Sun-spots, Cyclone theory of, *F. H. Collins*.....A1:826
Formation of, *J. R. Hooper*.....S7:397
Level of, *W. M. Mitchell*.....P13:392
note.....P15:187
in line of sight, Motion of vapors in.....P15:319
Mechanical causes of, *J. M. Schaeberle*.....A3:278
Naked eye, *W. E. Wilson*.....S8:322
Notes on, *R. E. Bruce*.....P13: 82
Number of, *W. Dawson*.....S3:171
Origin of, *E. von Oppolzer*.....A2:419
numbers of, Revision of Wolf's, *A. Wolfer*.....P10:449
Thermal radiation from, *W. E. Wilson*.....A3:378
as vortex rings, *F. H. Bigelow*.....S6:139
and aurorae, Periodicity common to.....A1:526
Relation between, *M. A. Veeder*.....A1:434
magnetic storms.....A1:316, 499, 527
F. H. Hesse.....A1:615
A. Ricco.....A2: 33
their theories, *W. T. Lynn*.....P14: 90
Sunrise phenomenon, *L. G. Léon*.....P10:557
Sunset at sea, *E. D. Roe, Jr*.....P14:444
glow, *J. R. Hooper*.....S4:178
Sunsets, Red, *W. W. Payne*.....S2:293
Superstructure, *M. B. Cutler*.....S5:267
Surface markings of celestial objects, Methods of delineating, *F. L. O. Wadsworth*.....P5:200
Swasey, Ambrose, *J. A. Brashear*.....P7:345
Swift's, Lewis, medals, Description of, *L. Swift*.....P9:505
and honors, *W. W. Payne*.....P5: 96

Volume and Page

Symbols, Uniformity of mathematical, *A. E. Haynes*.....P8: 56
Syrtis Major, Markings in, *P. Lowell*.....P4:289
System of — *Cancri, S. W. Burnham*.....A2:872
Systems of Galileo, Ptolemaic and Copernican, *C. C. Hutchins*.....P12:442
Tablets of Nippur, Mathematical, *D. E. Smith*.....P15:366
Tangent index, *J. Haywood*.....S5:270
α *Tauri*, Occultations of.....S6:45, 194
α *Tauri, J. G. Porter*.....S4:187
ξ *Tauri, T. C. H. Bouton*.....P16:254
Taurus, Convergent of moving cluster in, *L. Boss*.....P16:506
Telescope aids ordinary vision, How the, *W. W. Payne*.....P3: 81
Bruce photographic, *E. C. Pickering*.....S8:304; P4:531
Buildings, Balance roof of, *A. E. Douglass*.....A2:207, 400
C. A. Post.....P2: 88
Care of the, *F. M. Gibson*.....P2:412
W. W. Payne.....P13:506
Clock-work of,.....S7:259
Efficiency of a small, *G. C. Comstock*.....S10:406
Equatorial, *H. M. Parkhurst*.....S7: 38
Five-inch, *G. P. Serviss*.....P1:372
for Amherst, Large refracting, *W. W. Payne*.....P11: 22
eclipse observations, Mounting for, *F. H. Bigelow*.....A1:257
Goodsell observatory, Williams equatorial.....S10:354
Greenwich observatory.....A3:317
Halsted observatory, *C. A. Young*.....S1:131
Harvard, Mounting the 60-inch, Chicago *Record-Herald*.....P14:142
E. C. Pickering.....P13:70, 106
Lehigh university.....S1: 71
Lick observatory, 36-inch, *E. S. Holden*.....S7:296
Nature.....S1: 99
W. W. Payne.....S9: 97
Potsdam, Photographic.....A3: 81
E. L. Schafer.....S1: 71
Lewis Swift.....S1:268
Yerkes.....S9:422
in high schools, Small, *W. W. Payne*.....P11:429, 491; P12:546, 608
Hints for small, *F. E. Harpham*.....P2:106
History of the *C. S. Hastings*.....S10:335
International southern,.....P14:639
Invention of, *D. W. Edgecomb*.....P7:184
Large southern, *E. C. Pickering*.....A1:783
lenses, Construction of, *C. Faulhaber*.....P13:534
mirror, Polishing and grinding, *G. S. Jones*.....S9:353
mountings and domes, *W. H. Pickering*.....A3: 1
New form of, *E. M. Tydeman*.....P8:464
Observations with a small, *C. W. Carlisle*.....P12:328

XUM

Volume and Page

Telescope, *(Continued)*
song, Herschellian, *E. S. Holden*....S3: 85
with spectroscope small, *D. E. Hadden*....P1:478
Three-inch, *W. Strong*....P13:203
Twenty-four inch, *E. C. Pickering*....P13:224
Vogel's opinion of Vienna....S4: 29
Telescopes, American, *D. Todd*....S7:412
Future, *A. G. Clark*....A2:189, 673
Good astronomical, *H. Grubb*....S7:106
Long focus, *W. Rollins*....A3:199
Methods of defining, delineating and resolving the power of, *F. L. O. Wadsworth*....P5:528
pay? Do large....A1:927
Possibilities of, *A. G. Clark*....A2:319
Problems in constructing large, *W. R. Warner*....A2:695
of short focal length, *H. L. Smith*....S1:239; S7:293, 360
Small vs. large, *S. W. Burnham*....S4:193
W. F. Denning....S4:259
F. P. Leavenworth....S9: 47
C. A. Young....S5: 1
Note on....A3:241
Two large, *A. A. Common*....A2: 11
in United States, *Congressional Record*....P8:292
W. H. Knight....S10:393, 475
Work for large, *E. C. Pickering*....A2:114
of world, Large, *W. W. Payne*....S3:193
and other optical instruments, *W. B. Musson*....P8:378
Telescopic illumination, *O. Stone*....S6: 73
Tempel's second periodic comet, (*c* 1899) *C. D. Perrine*....P7:291
Temperature for gaseous celestial bodies, Law of, *T. J. J. See*....P7:129
C. A. Young....P7:225
of sun and stars, Surface, *J. Scheiner*....A3:569
Temperatures of Mars, Venus and Mercury, *S. J. Corrigan*....P16:258
Teneriffe, Alta Vista, Teyde, *D. W. Edgecomb*....S9:392
Terrestrial magnetism, Solar origin of, See Magnetic disturbance.
Terrestrial magnetism, *H. Harvey*....P9:467
during solar eclipse....P16:196
Test objects for small telescopes....A3:168
of photographic plates, Standard....P16:261
Thales, Eclipse of, *W. H. S. Monck*....P10:127
J. N. Stockwell....P9:376
Thermodynamics of the atmosphere....P15:316
Thoth and the Amenthes, *P. Lowell*....P13:251
Three bodies, Problem of, *F. R. Moulton*....P5:407
Tidal friction and planetary rotations, *I. E. Christian*....P9:194
wave on terrestrial spheroid, Propagation of, *T. J. J. See*....P8:373

Volume and Page

Tides, Origin of, *A. K. Bartlett*....P11:494
Time, *F. R. Moulton*....P12:391
J. G. Porter....S6: 95
Geological, *W. Upham*....P14:264
latitude, azimuth for field work, Obtaining, *W. E. Cooke*....P11:169
observations with small transit....S3:209
obtained with engineer's transit, *G. O. James*....P15:475
F. H. Scares....P13:553
from single altitudes, *S. D. Townley*....P14:148
with surveyor's transit, *G. O. James*....P13:499
Origin of standard....P14:638
Solar and sidereal, *A. K. Bartlett*....P12:649
stars for amateurs, *E. Iliff* and *L. Waterbury*....P2: 74
Transmission of, *O. Klotz*....P15:129
True unit of....S3:122
service at Cape Good Hope....P13:576
Dominion observatory, Canada....P15:321
Goodsell observatory....S1: 16
Harvard observatory....A1:345
Lick observatory, *J. E. Keeler*....S6:233
United States Naval observatory....S9: 57
Washburn observatory, *S. D. Townley*....S1:24; A1:467
signal from United States Naval observatory....P10:447; P13:110, 143
W. W. Payne....P12:613, 684
and azimuth, New method of obtaining....S6:224
latitude determined from equal altitudes, *G. C. Comstock*....P11:238
time signals, *C. R. Willard*....P1: 60
Transit circle, Effect of temperature upon constants of, *H. R. Morgan*....P14:452
observations, 1875-1883, Washington....S8:470
factor tables, Computing, *H. S. Davis*....P10:303
Hanging level attached to portable, *T. H. Safford*....S9:433
instrument, Automatic, *F. H. Bigelow*....S7:205
instruments, Flexure of the axis, *C. A. Young*....S2:101
observations for time, Reducing, *C. B. Hill*....A2:212
by photography, *W. P. Gerrish*....S9:111
pivots at Washburn, Inequality of, *A. J. Sanborn*....S2:225
Transiting stars, New method of, *M. B. Snyder*....P10:350
Transits of inferior planets, *J. R. Eastman*....S2:182
of Venus and Mercury, *J. Morrison*....P5:536
Method of calculating, *M. Updegraff*....S10:225
Triad of stars, *E. W. Maunder*....P16:403
Triangulation of the circumpolar region, Heliometer....P12:429
Trifid nebula, M 8, Photographs of, *E. E. Barnard*....A3:791
Tucker, R. H., the head of Southern observatory....P16:327
Twilight, *O. E. Harmon*....P4:148, 211, 252; P5:257
Ultra-violet rays of spectrum....A1:825

XUM

Volume and Page

Ultra-violet rays, *(Continued)*
Photographing A1:829
Universe, On an infinite, *O. Ely* P16:435
G. W. Hough P16:461
W. H. S. Monck P16:596
limited and spherical in form? Is the P12: 69
Man's place in the P11:223
United States Coast Survey office A3:414
Naval observatory, *W. W. Payne,* A3:601, 707; P2:91; P5: 166, 223, 224, 330, 501; P7:365, 459, 500; P9:71, 166, 216, 350, 563; P10:14, 387; P11:57, 276, 520.
Time service of, (See Time Signal from U. S. N. ob.)
Uranus, Discovery of, *H. P. Tuttle* S8: 34
Figure of S3:315
Note S2:254
Occultation of, *F. E. Seagrave* A1:540
Satellites of, *H. Harrison* S8:275
Note on S8:231
Spectrum of S8:329
Tables of P7:502
and Saturn, Photographic spectra of, *Mr. and Mrs. Huggins* S8:450
ζ *Ursae Majoris* Spectrum of, *E. C. Pickering* S9: 80
ϕ *Ursae Majoris,* Orbit of P11:576
β *Ursae Minoris,* Suspected variable S1:130
Π^2 *Ursae Minoris* (Σ 1989) *S. W. Burnham* A1:548
Ursids, See Meteors.
Vacant regions of the sky, *E. E. Barnard* P14:579
Vacation notes, *T. J. J. See* P6:360
Vacuum-spectrograph, *Herr Schumann's* A1:237
Variability and the asteroids, *G. A. Thompson* P13:378
Variable star atlas in preparation, *J. G. Hagen* P5:20; P7: 85
P. S. Yendell P14:298
catalogue, Preparations for new, *G. Müller* P11:138
clusters, *E. C. Pickering* P3:197; P5:276; P6:505
New, *E. C. Pickering* A1:752
kind of, *J. A. Parkhurst* P3:214
phenomena, Chandler on S8:277
Suspected, BD + 37°811 *Persei* P15:313
Variable stars, *J. M. Barr* P15:217
W. J. Gill, Jr P4:434
J. A. Parkhurst, P1:125, 161, 212, 263, 315, 358, 397, 460; P2:18, 95.
W. W. Payne S8:247
P. S. Yendell, P3:446; P4:13, 536; P5:16, 84, 172, 235, 302, 399; P12:32.
of *Algol* type, *W. H. S. Monck* P5:559

Volume and Page

Variable stars, *(Continued)*
of *Algol* type, *E. C. Pickering*.....P8:162; P10:157
H. C. Wilson.....P8:113
Minima of.....A1:84, 165, 247, 340, 440, 534, 624, 743, 834, 939; A2:82, 179, 275, 368, 467, 567, 657, 754, 853, 933; A3:79, 167, 253, 322, 409, 510, 592, 703, 778; P1:41, 88, 142, 236, 280, 332, 379, 420, 468; P2:36, 84, 137; P3:36, 149, 208, 326, 375, 430; P4:103, 158, 217, 270, 330, 384, 447, 527, 572; P5:48, 109, 162, 217, 270, 325, 388, 437, 497, 554; P6:52, 116, 182, 246, 302, 353, 412, 472, 531, 581; P7:41, 93, 161, 214, 265, 319, 378 435, 492, 535; P8:44, 100, 157, 213, 286, 343, 395, 458, 515; P9:104, 460, 516, 572; P10:46, 101, 156, 213, 269, 327, 383, 440, 495, 544; P11:48, 97, 156, 209, 269, 334, 402, 454, 507, 569; P12:59, 138, 206, 275, 353, 417, 491, 563, 622, 676; P13:50, 101, 160, 216, 277, 344, 405, 465, 521, 570; P14:59, 116, 177, 245, 309, 375, 436, 499, 567, 632; P15:55, 117, 180, 249, 308, 374, 438, 509, 573, 638; P16:58, 116, 183, 249, 316, 381, 446, 511, 581, 646.
Approximate magnitudes of, P11:99, 213, 271, 339, 403, 457, 510, 572; P12:61, 141, 209, 278, 356, 421, 495, 562, 623, 674; P13:48, 103, 163, 215, 276, 345, 407, 464, 519, 569; P14:61, 115, 175, 244, 307, 377, 434, 498, 569, 635; P15:52, 115, 182, 251, 310, 376, 436, 506, 575, 635; P16:114, 186, 252, 319, 385, 450, 514, 584, 649.
Comparison stars for, *E. C. Pickering*.....P6:125
long period.....P1:282
Co-operation in observing, *E. C. Pickering*.....P9:148
Density of *Algol*.....P8:105; P16:454
with different notation, *H. C. Wilson*.....P10:312
discovered in 1907, *W. E. Sperra*.....P16:488
Discoveries of, *G. A. Thompson*.....P13:445
Distribution of type IV of.....P7:536
Durchmusterung of, *E. C. Pickering*.....P14:508
Ephemeris of.....S1:104
Gore's revised catalogue of.....S8: 41
Harvard circular lists of new, No. 6, P3:481; No. 7, P4:48; No. 10, P4:224; No. 12, P14:446; No. 24, P6:55; No. 34, P6:530; No. 47, P8:162; No. 79, P12:566; No. 90, P13:218; No. 91, P13:221; P14:160; No. 122, P15:56; No. 124, P15:185; No. 132, P16:55;

XUM

Volume and Page

Harvard circular, *(Continued)*
No. 133, P16:56.
map list, *E. C. Pickering*.....P15:617
Light curves:
RS *Aquarii*, (— 1898).....P15:185
U *Aquilae*, (— 1886).....P14:432
η Aquilae, (— 1784).....P11:573
X *Aurigae*, (8.1900).....P12:211
Y *Aurigae*, (71.1901).....P13:275
R *Camelopardalis* (— 1858).....P6: 54
RV *Capricornae* (108.1905).....P14: 58
RY *Cassiopeiae*, (28.1906).....P15:380
U *Cephei* (— 1880).....P10:159
SU *Cygni* (— 1897).....P15:119
UY *Cygni* (1.1902).....P15:640
VW *Cygni* (55.1903).....P14:249
VX *Cygni* (58.1903).....P13:340
VY *Cygni* (61.1903).....P15:572
VZ *Cygni* (7.1904).....P14:497
XZ *Cygni* (76.1905).....P14:433
ZZ *Cygni* (193.1906).....P15:254
RW *Draconis* (87.1906).....P15:511
RX *Herculis* (— 1898).....P10:159; P13:410
V *Lacertae* (110.1904).....P16:123
β Lyrae (—1784).....P11:399; P13:275
Y *Lyrae* (12.1900).....P10:215
RV *Lyrae* (13.1902).....P14:250
Messier cluster, 33 of 5.....P7:495
U *Ophiuchi* (1871).....P11:573
RY *Persei* (120.1906).....P15:380
RV *Tauri* (45.1905).....P16:387
W *Ursae Majoris* (3.1903).....P11:215
X *Vulpeculae* (161.1904).....P15:511
Missing, RR *Cygni*.....P11:216
Long period, *J. A. Parkhurst*.....P2:215, 316, 415
Maxima and minima of long period, P1:419, 469; P2:37, 83, 136; P3:37; P4:104, 158, 216, 270, 330, 383, 447, 526, 571; P5:48, 109, 164, 218, 269, 326, 555; P6:53, 116, 183, 246, 303, 353, 412, 472; P7:92, 161, 215, 264, 320, 377, 435; P8:98, 156, 212, 286, 342, 394, 458; P9:517, 572; P10:47, 102, 157, 214, 270, 330, 384, 441, 496; P11:49, 98, 159, 213, 272, 338, 405, 456, 509.
Maxima of short period, not *Algol* type, P9:517; P10:157, 214, 270, 328, 384, 441, 496, 545; P11:99, 158, 211, 270, 336, 404, 455, 508, 570; P12:60, 140, 208, 277, 355, 419, 493, 564, 624, 675; P13:49, 104, 162, 214, 278, 341, 408, 467, 520, 568; P14:60, 118, 178, 247, 310, 376, 437, 501, 568, 634; P15:54, 114, 183, 252, 311, 378, 440,

Volume and Page

Variable stars, Maxima of short period, not of *Algol* type, *(Continued)*
507, 572, 637; **P16:**60, 118, 185, 250, 318, 383, 448, 513, 583, 648.
Naming recently discovered....P10:442; P12:62; P14:179
in nebula....P10:494
New (Elements)
W *Andromedae* (1899)....P7:162, 215
X *Andromedae* (3.1900)....P13:514
RR *Andromedae* (69.1901)....P13:514
RS *Andromedae* (— 1898)....P12: 63
RU *Andromedae* (11.1903)....P11:274, 340; P12: 62
— *Andromedae* (62.1903)....P12:142
RV *Andromedae* (17.1904)....P12:423
RW *Andromedae* (189.1904)....P13:157; P14:179
RX *Andromedae* (38.1905)....P13:274; P14:179
RY *Andromedae* (44.1905)....P13:338; P14:180
RZ *Andromedae* (166.1904)....P13:52; P14:637
SS *Andromedae* (167.1904)....P13:52; P14:637
ST *Andromedae* (52.1906)....P16:121
SU *Andromedae* (53.1906)....P16:121
SV *Andromedae* (1.1907)....P15:255; P16:121
SW *Andromedae* (5.1907)....P16:120
SX *Andromedae* (51.1907)....P15:443; P16:120
SY *Andromedae* (136.1907)....P15:571; P16:54, 182, 247
SZ *Andromedae* (141.1907)....P16: 55
TT *Andromedae* (143.1907)....P16:55, 247
RS *Aquarii* (1898)....P7:320
RV *Aquarii* (48.1907)....P15:442; P16:121
— *Aquarii* (163.1907)....P16: 56
Y *Aquilae*....P6:418
RT *Aquilae* (1897)....P5:556; P13:514
RU *Aquilae* (1898)....P6:532; P7:265
RX *Aquilae* (71.1903)....P12:210
RY *Aquilae* (77.1903)....P12:210
RZ *Aquilae* (83.1903)....P12:210
SS *Aquilae* (64.1903)....P14:180
ST *Aquilae* (78.1903)....P14:180
SU *Aquilae* (33.1905)....P14:180
(64.—85.1903)....P12:210
SV *Aquilae* (68.1903)....P14:637
SW *Aquilae* (79.1903)....P14:637
SX *Aquilae* (80.1903)....P14:637
Aquilae (2.—37.1905) near δ....P13:273
Aquilae (48.—57.1905)....P13:411
SY *Aquilae* (48.1906)....P14:637
Aquilae (80.—85.1906)....P14:496
SZ *Aquilae* (63.1907)....P15:443; P16:121

XUM

Volume and Page

Variable stars, New, *(Continued)*

TT *Aquilae* (64.1907) P15:443; P16:121
Nova *Aquilae* (104.1905) P13:513
Aquilae, 25 new in P12:565
Aquilae, 76 new in P12:566
— *Arietis* (116.1905) P14:119
— *Arietis* (147.1907) P16: 55
W *Aurigae* (1898) P7:43, 215; P8:515
Z *Aurigae* (1.1903) P11:214; P12:62; P13:514
RS *Aurigae* (157.1904) P12:677
RT *Aurigae* (47.1905) P13:339; P14:179
RU *Aurigae* (62.1905) P13:411; P14:179
RV *Aurigae* (21.1904) P14:637
RW *Aurigae* (27.1906) P14:304, 637
RX *Aurigae* (33.1906) P14:374, 637; P15:184
RY *Aurigae* (27.1907) P15:381; P16:120, 247, 248
RZ *Aurigae* (29.1907) P15:441; P16:580
SS *Aurigae* (31.1907) P15:441; P16:246, 387, 509, 580, 652
ST *Aurigae* (32.1907) P15:441
SV *Aurigae* (180.1907) P16:123
SW *Aurigae* (181.1907) P16:123
SX *Aurigae* (79.1907) P16:321
SY *Aurigae* (80.1907) P16:321
— *Aurigae* (30.1907) P15:441
— *Aurigae* (78.1907) P16:580
— *Aurigae* (148.1907) P16: 55
— *Aurigae* (3.1908) P16:247
— *Aurigae* (4.1908) P16:247
— *Aurigae* (44.1908) P16:652
— *Aurigae* (45.1908) P16:652
— *Aurigae* (49.1908) P16:652
RR *Boötis* (86.1906) P14:497; P16:120
RS *Boötis* (14.1907) P15:185; P16:120
RT *Boötis* (67.1907) P16:120
Boötis (172.1907) P16: 56
Boötis (15.1908) P16:510
V *Camelopardalis* P10:442
W *Camelopardalis* (20.1903) P11:398; P12: 62
X *Camelopardalis* (22.1903) P11.398; P12: 62
Y *Camelopardalis* (21.1903) P11:398, 458; P12: 62
Z *Camelopardalis* (183.1904) P13:52; P14:181
RR *Camelopardalis* (40.1905) P13:218; P14:179
RS *Camelopardalis* (105.1905) P13:514; P14:180
RT *Camelopardalis* (34.1906) P14:374, 637
RU *Camelopardalis* (2. 1907) P15:255, 512; P16:120
RV *Camelopardalis* (7.1907) P15:185; P16:120

Volume and Page

Variable stars, New, *(Continued)*

RW *Camelopardalis* (39.1907) P15:442; P16:182
RX *Camelopardalis* (40.1907) P15:442
— *Camelopardalis* (41.1907) P15:442
— *Camelopardalis* (57.1908) P16:652
— *Camelopardalis* (58.1908) P16:652
Y *Cancri* (3.1904) P12:210
— *Cancri* (151.1907) P16: 55
U *Canis Majoris* (189.1907) P16:248
V *Canis Majoris* (193.1907) P16:248
— *Canis Majoris* (150.1907) P16: 55
— *Canis Majoris* (194.1907) P16:248
— *Canis Majoris* (195.1907) P16:248
Canis Venatici (138.1907) P15:640
Canis Venatici (140.1907) P15:640
RU *Capricorni* (99.1901) P10:442, 444
RV *Capricorni* (108.1905) P14:58, 637
RY *Carinae* (98.1901) P10:442, 444
SS *Carinae* (73.1906) P14:434, 637
ST *Carinae* (158.1906) P16:120
— *Carinae* (5.1906) P15:185
— *Carinae* (152.1907) P16: 55
(157.—192.1906) P15:185
Y *Cassiopeiae* (1898) P6:55, 118
Z *Cassiopeiae* (1898) P7:94, 160, 215
RR *Cassiopeiae* (5.1900) P13:518
RS *Cassiopeiae* (108.1904) P12:497; P15:512
RT *Cassiopeiae* (160.1904) P12:677
RU *Cassiopeiae* (186.1904) P14:179
RV *Cassiopeiae* (41.1905) P13:274; P14:179
RW *Cassiopeiae* (46.1905) P13:338; P14:179, 497
RX *Cassiopeiae* (6.1904) P12:279; P14:496, 636
RY *Cassiopeiae* (28.1906) P14:304, 637; P15:380, 512
RZ *Cassiopeiae* (77.1906) P14:636
SS *Cassiopeiae* (64.1905) P16:120
ST *Cassiopeiae* (155.1906) P15:184; P16:120
SV *Cassiopeiae* (194.1906) P15:255; P16:122
SW *Cassiopeiae* (65.1907) P15:443; P16:121, 182
SX *Cassiopeiae* (142.1907) P16:55, 321
— *Cassiopeiae* (190.1904) P13:157
— *Cassiopeiae* (65.1905) P16:120
Cassiopeiae (36.—38.1907) P15:442
— *Cassiopeiae* (179.1907) P16:123
— *Cassiopeiae* (142.1908) P16:651
RX *Centauri* (— 1902) P10:442
RZ *Centauri* (141.1906) P16:120

XUM

Volume and Page

Variable stars, New, *(Continued)*

SS *Centauri* (149.1906)....P16:120
ST *Centauri* (169.1906)....P16:120
SU *Centauri* (170.1906)....P16:120
SV *Centauri* (177.1906)....P16:120
SW *Centauri* (182.1906)....P16:120
SX *Centauri* (183.1906)....P16:120
SY *Centauri* (190.1906)....P16:120
SZ *Centauri* (191.1906)....P16:120
TT *Centauri* (11.1907)....P15:185; P16:120
TU *Centauri* (13.1907)....P16:120
— *Centauri* (157.1907)....P16: 56
δ *Cephei* (1784)....P11:273
X *Cephei*....P6:532; P7:493
Z *Cephei* (15.1903)....P11:345; P12: 62
RR *Cephei* (56.1903)....P11:511; P12: 62
RS *Cephei* (79.1905)....P13:471, 571; P14:179
RT *Cephei* (185.1904)....P13:52; P14:180
RU *Cephei* (31.1906)....P14:306, 637
RV *Cephei* (32.1906)....P14:306, 637
Z *Ceti* (156.1904)....P12:625, 677; P14:57; P16: 56
— *Circini*....P16: 56
— *Coeli* (187.1907)....P16:248
V *Columbae* (188.1907)....P16:248
W *Columbae* (190.1907)....P16:248
— *Coma* (1897)....P5:270, 436, 556
V *Coronae*....P12:496
W *Coronae* (18.1902)....P11:50; P13:514
X *Coronae* (44.1906)....P14:637
Y *Coronae* (16.1907)....P15:185; P16:120
Z *Coronae* (17.1907)....P15:185; P16:120
U *Cor Austr.* 92.1901)....P10: 45
— *Cor. Austr.* (22.1908)....P16:579
— *Cor. Austr.* (24.1908)....P16:579
— *Cor Austr.* (36.1908)....P16:580
— *Cor. Bor.* (158.1907)....P16: 56
— *Cor. Bor.* (173.1907)....P16: 56
— *Corvi* (156.1907)....P16: 55
V *Crucis* (26.1904)....P14:637
W *Crucis* (180.1906)....P16:120
X *Crucis* (186.1906)....P16:120
RT *Cygni* (1890)....S9:232; P6:473
SS *Cygni* (1896), P4:104; P5:47, 110, 271, 328, 386, 557; P6:54, 304, 413, 532, 587; P7:43, 95, 163, 267, 380, 437, 537; P8:46, 100, 158, 287, 343, 459; P9:48; P11:52, 273; P12:496; P13: 105.

Volume and Page

Variable stars, New, *(Continued)*

ST *Cygni* (1898) P6: 247, 304
SU *Cygni* (1897) P15: 119
SW *Cygni* (1899) P7: 379; P9: 518; P12: 496
SY *Cygni* (1899) P8: 158, 215
TU *Cygni* (13.1900) P9: 48
UU *Cygni* (38.1901) P13: 514, 518
UW *Cygni* (78.1901) P9: 571; P10: 442
UX *Cygni* (96.1901) P10: 100, 442
UY *Cygni* (1.1902) P10: 218, 442
UZ *Cygni* (10.1902) P10: 385, 442; P12: 424
VV *Cygni* (20.1902) P11: 101, 398; P12: 62
VW *Cygni* (55.1903) P11: 458; P12: 62
VX *Cygni* (58.1903) P11: 571
VY *Cygni* (6.1903) P12: 63
VZ *Cygni* (7.1904) P12: 280
WW *Cygni* (154.1904) P12: 568, 625; P15: 512
WX *Cygni* (59.1903) P11: 510, 572
WY *Cygni* (164.1904) P12: 678
WZ *Cygni* (107.1905) P14: 57, 180
XX *Cygni* (14.1904) P12: 358; P14: 496, 637
XY *Cygni* (72.1905) P13: 412; P14: 637
XZ *Cygni* (76.1905) P13: 412; P14: 433, 637
YY *Cygni* (94.1901) P10: 45; P13: 156; P14: 637
YZ *Cygni* (33.1904) P16: 121
ZZ *Cygni* (193.1906) P15: 254; P16: 121
AA *Cygni* P16: 121
— *Cygni* (161.1907) P16: 56
W *Delphini* (1895) P3: 375, 376; P4: 448; P13: 518
Y *Delphini* (15.1902) P11: 50; P13: 514
Z *Delphini* (16.1902) P11: 50; P12: 62; P13: 514
RR *Delphini* (79.1906) P14: 439, 569, 637
RS *Delphini* (20.1907) P15: 185; P16: 121
U *Draconis* (1897) P5: 556
— *Draconis* (1.1900) P8: 215
W *Draconis* (6.1902) P10: 442
X *Draconis* (7.1902) P10: 442
Y *Draconis* (2.1903) P11: 215
Z *Draconis* (4.1903) P11: 216, 275, 397, 571
— *Draconis* (184.1904) P13: 52
RR *Draconis* (188.1904) P13: 157; P14: 180; P15: 119
RS *Draconis* (39.1905) P13: 218; P14: 180
RT *Draconis* (74.1905) P14: 180
RU *Draconis* (75.1905) P14: 180
RV *Draconis* (54.1906) P14: 434; P16: 120
RW *Draconis* (87.1907) P14: 497; P15: 510, 512; P16: 120

XUM

Volume and Page

Variable stars, New, *(Continued)*

RX *Draconis* (121.1906) P14:631; P15:119; P16:121
— *Draconis* (— 1906) P15:185
RY *Draconis* (10.1907) P15:312; P16:120
RZ *Draconis* (26.1907) P15:381, 512; P16.121
SS *Draconis* (47.1907) P15:442
ST *Draconis* (182.1907) P16:182
SU *Draconis* (43.1907) P15:442; P16:182
Draconis (43. and 45.1907), *W. E. Sperra* P16:569
— *Draconis* (159.1907) P16: 56
— *Draconis* (160.1907) P16: 56
— *Draconis* (141.1908) P16:651
X *Geminorum* P6:184; P7: 42
Y *Geminorum* (4.1902) P10:271; P12: 62
— *Geminorum* (7.1903) P11:273
Z *Geminorum* (9.1903) P11:273; P12:62; P13:514
— *Geminorum* (12.1903) P11:274, 339
RR *Geminorum* (13.1903) P11:274; P12:62; P15: 57
RS *Geminorum* (14.1903) P11:275; P12: 62
RT *Geminorum* (12.1904) P12:357
RU *Geminorum* (15.1904) P12:422
RV *Geminorum* (141.1904) P12:567
— *Geminorum* (63.1905) P13:411
RW *Geminorum* (30.1906) P14:305, 637
RX *Geminorum* (49.1907) P16:248
— *Geminorum* (1.1908) P16:182
RY *Geminorum* (6.1908) P16:320
— *Geminorum* (51.1908) P16:652
— *Geminorum* (52.1908) P16:652
— *Geminorum* (54.1908) P16:652
— *Geminorum* (56.1908) P16:652
RU *Herculis* P4:384
RV *Herculis* P5:326
RX *Herculis* P6:581; P7:215, 535
RY *Herculis* P7:537; P8:45, 158
SS *Herculis* (77.1901) P9:515; P10:442
ST *Herculis* (29.1903) P11:398
SU *Herculis* (31.1903) P11:458; P12: 62
SV *Herculis* (162.1904) P12:678
SW *Herculis* (3.1907) P15:313; P16:120
Herculis (174.—177.1907) P16: 56
— *Herculis* (20.1908) P16:579
— *Herculis* (138.1908) P16:581
Hydrae (163. and 164.1907) P16: 56
— *Hydrae* (171.1907) P16: 56
Indi (196.1907) P16:248

Volume and Page

Variable stars, New, *(Continued)*

— *Lacertae* P5:437
U *Lacertae* (2.1902) P10:270, 275, 442; P13:514
V *Lacertae* (110.1904) P16:123
W *Lacertae* (163.1904) P12:678
X *Lacertae* (88.1906) P14:497; P16:121, 123
Y *Lacertae* (23.1907) P15:312, 512; P16:121
Z *Lacertae* (132.1907) P16:182
RR *Lacertae* (133.1907) P16:182
— *Lacertae* (10.1908) P16:446
— *Leonis* (13.1904) P12:358
X *Leonis* (66.1907) P16:120
Y *Leonis* (165.1907) P16:56, 510
Z *Leonis* (167.1907) P16:56, 510
— *Leonis* (170.1907) P16: 56
S *Leonis Minoris* (19.1904) P12:423
— *Leonis Minoris* (166.1907) P16: 56
— *Leonis Minoris* (169.1907) P16: 56
Librae, near 5 Messier, *D. E. Packer* S9:381; S10:107
X *Lupi* (69.1905) P16:120
Y *Lupi* (15.1907) P15:185; P16:120
S *Lyncis* (1898) P6:118, 185, 354
T *Lyncis* (1.1906) P14:181, 637
U *Lyncis* (9.1908) P16:445
— *Lyncis* (55.1908) P16:652
V *Lyrae* (1895) P6:354
W *Lyrae* (1896) P5:327
Y *Lyrae* (12.1900) P9: 49
Z *Lyrae* (15.1900) P9: 49
RT *Lyrae* (5.1902) P10:329, 442; P13:514
RU *Lyrae* (11.1902) P10:385, 442
RV *Lyrae* (13.1902) P10:439
RW *Lyrae* (17.1902) P11:50, 101; P12: 62
RX *Lyrae* (10.1903) P11:274, 397; P12:62, 418; P13:514
RY *Lyrae* (17.1903) P11:397; P12: 62
RZ *Lyrae* (19.1903) P11:401, 453; P12: 62
SS *Lyrae* (63.1903) P12:142, 210
ST *Lyrae* (109.1904) P12:497
SU *Lyrae* (59.1905) P13:339, 512; P14:180
SV *Lyrae* (80.1905) P14:180
— *Lyrae* (80.—101.1905) P13:512
SW *Lyrae* (81.1905) P14:180
SX *Lyrae* (82.1905) P14:180
SY *Lyrae* (30.1904) P16:121
— *Lyrae* (139.1908) P16:651
RR *Monocerotis* (16.1903) P11:345; P12: 62

XUM

Volume and Page

Variable stars, New, *(Continued)*

RS *Monocerotis* (10.1904) P12:357
RT *Monocerotis* (42.1905) P13:274; P14:180
RU *Monocerotis* (43.1905) P13:274; P14:179; P15:512
RV *Monocerotis* (3.1902) P10:270; P16:120
RW *Monocerotis* (24.1907) P15:312; P16:120
— *Monocerotis* (149.1907) P16: 55
RX *Monocerotis* (7.1908) P16:387
T *Muscae* (— 1904) P14:180
U *Muscae* (153.1906) P16:120
— *Muscae* (153.1907) P16: 55
— *Muscae* (155.1907) P16: 55
U *Ophiuchi* (1871) Period of S1:272
Z *Ophiuchi* (1894) P1:324
RT *Ophiuchi* (76.1901) P12:62; P13:514
RU *Ophiuchi* (18.1904) P12:423
RV *Ophiuchi* (136.1904) P14:432
RW *Ophiuchi* (158.1904) P12:677
RX *Ophiuchi* (60.1905) P13:351; P14:180
RY *Ophiuchi* (77.1905) P13:412; P14:180
RZ *Ophiuchi* (103.1905) P13:513; P14:180, 498, 632
SS *Ophiuchi* (50.1907) P15:443; P16:120
ST *Ophiuchi* (52.1907) P15:443; P16:120
SU *Ophiuchi* (53.1907) P15:443; P16:120
SV *Ophiuchi* (54.1907) P15:443; P16:120
— *Ophiuchi* (60.1907) P15:443; P16:120
X *Orionis* (11.1904) P12:357
Y *Orionis* (49.1903) P12:357; P13:157; P14:179
— *Orionis* (8.1904) P12:280
— *Orionis* (9.1904) P12:357, 422
Orionis (168—182.1904) P13: 52
Orionis (11.1908) P16:446
Orionis (50.1908) P16:652
Orionis (53.1908) P16:652
T *Pegasi* (1863) P13:514
U *Pegasi* (1894) P3:215
Y *Pegasi* (14.1900) P9:49; P13:514
RR *Pegasi* (95.1901) P10:46, 442
RS *Pegasi* (12.1902) P10:385, 442; P13:514
RT *Pegasi* (19.1902) P11:50; P12:62; P13:514
RU *Pegasi* (142.1904) P12:567
RV *Pegasi* (159.1904) P12:677
RX *Pegasi* (70.1905) P16:122
RY *Pegasi* (50.1906) P16:122
RZ *Pegasi* (51.1906) P16:122
— *Pegasi* (162.1907) P16: 56

XUM

Volume and Page

Variable stars, New, *(Continued)*

κ *Persei* (74.1901) **P9:**407
Y *Persei* (68.1901) **P13:**514
Z *Persei* (14.1902) **P10:**545; **P12:** 62
RR *Persei* (1.1904) **P12:**205; **P13:**514
RS *Persei* (16.1904) **P12:**422
RT *Persei* (155.1904) **P12:**625; **P13:**514
RU *Persei* (187.1904) **P13:**100; **P14:**179
RV *Persei* (61.1905) **P13:**411; **P14:**179; **P15:**379, 512
RW *Persei* (29.1906) **P14:**304, 637
RX *Persei* (35.1906) **P14:**374, 637
RY *Persei* (120.1906) **P15:**184, 253, 380; **P16:**120
RZ *Persei* (156.1906) **P15:**184, 312; **P16:**120
SS *Persei* (33.1907) **P15:**442; **P16:**120
— *Persei* (34.1907) **P15:**442
ST *Persei* (67.1907) **P16:**182
SU *Persei* (35.1907) **P15:**442
SV *Persei* (73.1907) **P16:**182
SW *Persei* (2.1908) **P16:**182
— *Persei* (17.1908) **P16:**510
Novae, 1 and 2, (See *Persei*, Novae)
U *Phoenicis* (184.1907) **P16:**248
— *Phoenicis* (197.1907) **P16:**248
— *Phoenicis* (198.1907) **P16:**248
T *Pictoris* — **P16:**120
Z *Puppis* (1897) **P7:** 42
RV *Puppis* (192.1907) **P16:**248
U *Sagittae* (93.1901) **P10:**45, 157, 215; **P13:**518
V *Sagittae* (21.1902) **P11:**102; **P12:** 62
W *Sagittae* (46.1906) **P14:**637
Nova *Sagittarii* (1899) **P7:**266
V *Sagittarii* (165.1904) **P13:** 51
SV *Sagittarii* (30.1903) **P11:**398
SX *Sagittarii* (78.1906) **P14:**439, 637
— *Sagittarii* (139.1904) **P12:**567
— *Sagittarii* (23.1908) **P16:**579
Sagittarii (25.—33.1908) **P16:**579
Sagittarii (38.—42.1908) **P16:**580
— *Sagittarii* (140.1908) **P16:**651
R *Scorpii* (1853) **P4:**275, 331; **P6:**354
Scorpii 105 in **P13:**156, 219
Scorpii (18. and 19.1908) **P16:**579
— *Scorpii* (21.1908) **P16:**579
U *Scuti* (73.1901) **P15:**512
V *Scuti* (140.1904) **P12:**567
W *Scuti* (56.1907) **P16:**121

XUM

Volume and Page

Variable stars, New, *(Continued)*

X *Scuti* (57.1907) P16: 121
Y *Scuti* (58.1907) P16: 121
Z *Scuti* (61.1907) P16: 121
Scuti (34., 35. and 37.1908) P16: 580
W *Serpentis* (55.1907) P16: 120
S *Sextantis* (42.1906) P16: 120
T *Sextantis* (168.1907) P16: 56
S *Tauri* (1855) P5: 109
Z *Tauri* (4.1903) P11: 216
RS *Tauri* (5.1903) P11: 216; P12: 62
— *Tauri* (6.1903) P11: 216
RT *Tauri* (2.1904) P12: 210
RV *Tauri* (45.1905) P13: 338; P14: 179
RW *Tauri* (102.1905) P13: 512, 513; P14: 179, 181; P16: 182
RX *Tauri* (279.1904) P14: 637
SS *Tauri* (178.1907) P16: 122
Tauri (46.—48.1908) P16: 652
R *Trianguli* (1871) P15: 443
U *Tucanae* — P16: 120
V *Tucanae* (185.1907) P16: 248
— *Tucanae* (183.1907) P16: 248
— *Tucanae* (186.1907) P16: 248
V *Ursae Majoris* (70.1901) P13: 514
W *Ursae Majoris* (3.1903) P11: 215; P12: 62
— *Ursae Majoris* (8.1903) P11: 273
RR *Ursae Majoris* (106.1905) P13: 514; P14: 180
RS *Ursae Majoris* (67.1905) P13: 571; P14: 180
RU *Ursae Majoris* (137.1907) P15: 640
RV *Ursae Majoris* (139.1907) P15: 640; P16: 247
RW *Ursae Majoris* (44.1907) P15: 442
— *Ursae Majoris* (28.1907) P15: 381
— *Ursae Majoris* (28.1907) P15: 381
— *Ursae Majoris* (46.1907) P15: 442
— *Ursae Majoris* (59.1908) P16: 652
T *Ursae Minoris* (57.1903) P11: 511; P12: 62
U *Ursae Minoris* (113.1904) P12: 498
Y *Velorum* (97.1901) P10: 442, 444
Z *Velorum* (28.1900) P10: 442
RR *Velorum* (91.1901) P10: 45, 442
RS *Velorum* (23.1904) P14: 637
Nova *Velorum* (154.1906) P16: 121
RU *Virginis* (1897) P13: 514
RZ *Virginis* (73.1905) P14: 180
SS *Virginis* (78.1905) P13: 470; P14: 180
ST *Virginis* (12.1907) P15: 185; P16: 120, 651

Volume and Page

Variable stars, New, *(Continued)*
SU *Virginis* (154.1907) P16: 55
U *Vulpeculae* (1897) P15:443
V *Vulpeculae* (4.1904) P12:279
W *Vulpeculae* (5.1904) P12:279
Vulpeculae (143.—153.1904) P12:567
X *Vulpeculae* (161.1904) P12:677
Y *Vulpeculae* (4.1907) P15:313; P16:121
— *Vulpeculae* (116.1908) P16:510
North circumpolar, *J. A. Parkhurst* P4:369, 419
Observation of, *E. E. Markwick* P12:193
P. S. Yendell P2:12, 95; P13:453; P14:537, 596
at Hamburg, *H. Graff* P13:514
R. O' Halloran P10:271
Observations and notes: (For discoveries and elements see New Variable Stars)
Algol P16: 56
S *Antliae* (1888) P12:498
ϵ *Aurigae* — P12:142
U *Aurigae* (1891) P10:273
W *Aurigae* (1898) P11:53, 401; P14:120
V *Boötis* (1884) P14:503; P15:512
Y *Camelopardalis* (21.1903) P16: 57
U *Cassiopeiae* (1887) P16:125
W *Cassiopeiae* (1894) P16:125, 254
RZ *Cassiopeiae* (77.1906) P16: 57
Radial motion of P15: 57
o Ceti, Mira, *J. A. Parkhurst* ..... P3:165; Cor. P3:208
Charts of P6:126
Maxima of, *R. O'Halloran* P5:55; P6:586; P7:437, 544
Notes S5:92; P3:262, 380, 390; P6:413; P7:215
Observations, *F. Bradbury* P3:262
D. Flanery P3:262
D. Hadden P6:55; P7:105; P8:219
R. O'Halloran. P3:384, 440; P4:334; P6:56, 126, 255, 586; P7:223, 544; P15:381; P16:123.
H. C. Wilson P3:150, 261, 390
Spectrum of, *H. C. Wilson*, ... P3:390
in *Cetus* suspected S1: 70
V *Coronae* P11:400; P12:496; P14:121, 502; P15:512
S *Cygni* (1860) P14:121
X *Cygni* (1886) P11: 50
SS *Cygni* (1896) P11:400; P14:121
(See *Cygnus*)
TX *Cygni* (22.1900), Period of P10:215

XUM

Volume and Page

Variable stars, Observations and notes, *(Continued)*
UY *Cygni* (1.1902) P11:333
RR *Delphini* (79.1906) P16: 57
U *Draconis* (1897) P11:400
Z *Draconis* (4.1903) P16: 57
Comparison stars for, *M. W. Whitney* P11:428
U *Geminorum* (1855), P6:117, 248, 303; P7:266; P8:158, 287; P11:96; P12:280; P13:106; P14:503; P15:382.
RW *Geminorum* (30.1906) P16: 57
R *Hydrae* (1670) P12:497; P13:469
V *Hydrae* (1888) P11:217; P12:497; P13:470
T *Lacertae* P5:437
R *Leonis* (1782) P15:382
β *Lyrae* (1784) P6:117
V *Lyrae* (1895) P11:398
W *Lyrae* (1896) P11:216, 399; P13:105, 470; P14:502
RZ *Ophiuchi* (103.1905) P15:641
α *Orionis* (1840), Spectrum of P8: 46
Variability of P11: 51
U *Orionis* (1885) P10:272
V *Orionis* (1887) P10:272; P12:496; P13:469; P14:121
Z *Persei* (14.1902) P16: 57
RY *Persei* (20.1906) P16: 57
LL *Puppis* (1872) P10:273
S *Sagittae* (1885) P13:411
R *Tauri* (1849) P10:273; P11:399; P15:513
S *Tauri* (1855) P10:271; P11:399
R *Ursae Majoris* (1853) P10:273
V *Ursae Majoris* (70.1901) P12:423
β *Ursae Minoris* S1:130
X *Virginis* (1871) P11:401
Y *Virginis* (1874) P13:469
Photographic magnitudes of P6:532
Plan for observing, *E. C. Pickering* S1:237; S2: 25
Relation between color and period of P16:322
of short period, *E. C. Pickering* P6:262
W. E. Sperra P3:404
P. S. Yendell P2:160, 202, 269, 362
Revised list of, *H. C. Wilson* P14:75, 255
Wilson's list of Algol, *F. H. Seares* P14:238
Vatican observatory, *W. A. Parr* P11:497
Vectors, Simple application of, *A. B. Turner* P16:408
Velocity curve of α *Carinae* P15:645
θ *Draconis* P15:646
ω *Draconis* P15:647
α *Pavonis* P15:645

Volume and Page

Velocity curve of, *(Continued)*
κ *Velorum* P15:646
in line of sight, Unit of, *E. B. Frost* A3:160
of stars determined by spectrograph, *H. C. Vogel* A1:203
Venus, *P. Lowell* P12:184
M. Winger P4:530
near inferior conjunction, *E. E. Barnard* S10: 43
observations, *A. E. Douglass* P6:253
A. R. J. F. Hassard P16:459
R. Sprague P2:287
Ring of light around, *J. A. Brashear* S1:263
Z. Daniel P15:516
J. E. Keeler S1:292
H. N. Russell P15:516
Rotation period of gravitation, *W. H. S. Monck* P5:168, 273
T. J. J. See P5:224
studied spectrographically, *P. Lowell* P11:426
and surface, *P. Lowell* P4:281, 389; P11:518
Supposed satellite of, *H. C. Wilson* S6:357
Terminator of, *W. Wetherbee* P12: 67
Note P8:237
Transit of, (1882), *E. E. Barnard*, S1:290; *E. Frisby*, S1:182; *W. Harkness*, S1:143; *C. S. Hastings*, S1:273; *E. L. Larkin*, S1:294; *C. A. Young*, S1:300.
Notes on, S1:128, 134, 143, 153, 182, 191, 193, 230, 260-5, 268-70, 290, 294, 299, 312-14; S2:27, 237.
and Jupiter in conjunction, *L. G. Léon* P11:160
γ Virginis, Orbit of, *Dr. Dorberck* P4:162
Vision, Limit of, *H. P. Tuttle* S8:302
Volcanic dust? Is it Pelee P10:446
"Vulcan" in 1860, Search for, *H. P. Tuttle* P7:235
U *Vulpeculae* and ST *Cygni*, *E. C. Pickering* S7:208
Watson's twenty-two asteroids P12:429, 645
Wave-length of light, Standard, *A. A. Michelson* and *E. W. Morley* S8:241, 278; S10:251
H. A. Rowland ..... A2:321; Cor. A2:563
Wave-lengths hitherto unrecognized S5:278
Weather indications along eclipse path, 1900, *F. H. Bigelow* P7:451
Webb, Thomas William, *A. Mee* P13:138
Whitin observatory of Wellesley college, *S. F. Whiting* P8:482
Wind forces on an observatory dome, *E. D. Roe, Jr* P14:347; P16:424
Winds and refractors A2:573, 762
Wire-intervals for transit instrument, *W. H. M. Christie* P15:302
Wolf-Rayet stars, *W. W. Campbell* A3:448
in *Cygnus*, *Mr. and Mrs. W. Huggins* S10: 49
Nebulosity about A1:236

Volume and Page

World's congress auxiliary, *G. W. Hough*.....A1:462
Yarnall's catalogue S6: 81
Yerkes observatory, *W. W. Payne*.....P5:115, 340; P14:458, 527
receives Bruce telescope.....P12:363
telescope, *W. W. Payne*.....A2:571; P1:176
Zenith tube, Wharton reflex, *E. Doolittle*.....P14:530
Zodiacal light *A. K. Bartlett*.....P10:179
Color of, *E. W. Maunder*.....P6:307
Early observations of.....P4:107
Northern limit of, *E. A. Fath*.....P16:633
Note on A2:599
Photographs of, *A. E. Douglass*.....P8:174; P9:190
and gegenschein P10:276
Milky Way, compared.....P16:589
stars for 1900-1902, Catalogue of.....P16:195
Zone observations.....S1:63, 67; S3:152

XUM